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Note.—Initialed reviews are written by the following:

Mr C. Barclay	C. B.
Mr G. E. Dixon	G. E. D.
Dr M. A. Keay	M. A. K.
Mrs R. H. Richens	R. H. R.
Mr L. Sachs	L. S.
Mr H. L. K. Whitehouse	H. L. K. W.
Dr J. Wishart	J. W.

* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XXI, No. 1

*STATISTICS

1.

Proceedings of the Auburn Conference on Statistics applied to Research in the Social Sciences, Plant Sciences and Animal Sciences, September 7-9, 1948.
Statist. Lab. Ala. Polytech. Inst. 1948 : Pp. 91.

Anderson, R. L. — *The use of regression techniques with economic data.* (*pp. 3–14*).

A mathematical discussion, illustrated by examples, is presented to show under what circumstances multiple regression equations can be used to analyse statistical data.

Rigney, J. A. — *Techniques in field plot experimentation.* (*pp. 39–44*).

Field trial layouts are considered under the following heads: plot shape, plot size, number of replications, number of locations and seasons, and subsampling plots.

Potter, G. F. — *Design of field experiments in tung orchards.* (*p. 45*). (*Abst.*).

The designs suitable for dealing with the problems presented by the layout of tung orchards are discussed.

Homeyer, P. G. — *Sampling replicated field experiments for yield determinations.* (*pp. 45–46*). (*Abst.*).

Sampling techniques are discussed in relation to yield estimations of maize and oats.

Snedecor, G. W. — *Some principles of experimental design.* (*pp. 47–51*).

A general account is given of the principles which should be applied in designing experiments to yield the optimum amount of unambiguous data.

Hull, F. H. — *Plot design with variety trials in Florida.* (*p. 51*). (*Abst.*).

Advances in statistical designs in agricultural research in Florida are described.

James, E. — *Incomplete block experiment with half plants.* (*p. 52*). (*Abst.*).

The effects of the major elements on hard seed protection in crimson clover have been investigated using plants split down the middle.

Burton, G. W. — *The use of split-plot factorial experiments in pasture and forage investigations.* (*p. 53*). (*Abst.*).

Split plot designs have proved useful in analysing the interactions between the components of a sward, and between these and environmental factors.

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* General studies, see also individual crops.

Ware, L. M. and Johnson, W. A. — *Use of field bins for experimental studies with vegetable crops.* (*pp. 54–60*).

The advantages and disadvantages are described of using "field bins" for experimental trials with vegetables. The bins are rectangular plots partitioned off by means of concrete walls. The bins are arranged in rows and are open on the side facing the path running alongside them.

Bancroft, T. A. and Smith, A. L. — *Efficiency of the simple lattice design relative to randomized complete blocks design in cotton variety and strain testing.* (*pp. 60–61*). (*Abst.*).

Simple lattice designs for cotton variety trials proved 18% more efficient than randomized complete blocks, though requiring more time to analyse.

2. SINGH, M.
Confounding in split-plot designs with restricted randomization of sub-plot treatments.
Emp. J. Exp. Agric. 1950 : **18** : 190–202.

A general account is given of the construction of split plot designs with confounding. Two examples used for potato yield trials are described. The designs are regarded as satisfactorily efficient.

3. BAKER, G. A. and HANNA, G. C.
Transformation of split-plot yield data to improve analysis of variance.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 273–75.

The error variance of broccoli yield data increases with yield. This effect can be rectified by using the square root transformation.

*GENETICS

4. DOBZHANSKY, T.
Genetics.
Sci. Amer. 1950 : **183** : No. 3 : 55–58.

The development of genetics during the last fifty years is outlined.

5. GOLDSCHMIDT, R. B.
Fifty years of genetics.
Amer. Nat. 1950 : **84** : 313–39.

The achievements of genetics since the beginning of the century and their growing impact upon other sciences are comprehensively surveyed. The paper was originally prepared to be read at the Golden Jubilee Meeting of the Genetics Society of America, September 1950.

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* General studies, see also individual crops.

6.

(For a patriotic Soviet science).
Vestnik Akad. Nauk SSSR. (Rec. Acad. Sci. USSR) 1949 : No. 4 : 3–14.

Bourgeois influences in Soviet science and philosophy are deprecated and cosmopolitan ideas rejected. Weismann-Morganism is identified with reactionary racial theories.

7.

(The results of the scientific research work of the academies of the Soviet Republics for the year 1948).
Vestnik Akad. Nauk SSSR (Rec. Acad. of Sci. USSR) 1949 : No. 7 : 85–107.

(Academy of Sciences of the Ukrainian SSR).
(pp. 85–88).

A. V. Palladin, the president, reported that important results have been obtained in the Section for Biological Sciences. The most outstanding work was done at the Institutes which avoided the errors inherent in Weismannism.

(Academy of Sciences of the White Russian SSR).
(pp. 89–39).

Advances in biology were mentioned in the progress report by the president.

Wheat-*Agropyron* hybrids
The trials conducted for two years in the Minsk province have proved new spring wheat-*Agropyron* hybrids N–22 and Z–2109 and a winter hybrid variety 690 to be superior to the White Russian standard wheat varieties.

Millet
Ten promising new varieties were obtained.

Lupin
New varieties of sweet lupin were developed. Artificial cross pollination experiments with yellow fodder lupins showed promise as a means of increasing their seed productiveness.

Potato
A new wart resistant variety, tentatively named Belorusskaja Skorospelka [White Russian Very Early], was tested. It did well on light sandy soils. Many clones showing resistance to wart were selected at the Institute of Socialist Agriculture.

Agrobiological methods
A technique for increasing the yielding capacity of buckwheat was developed, methods for improvement of hardiness and lodging resistance of cereals were studied and the effect of fertilizers upon the heritable yielding properties of maize and barley was determined. Methods were found to control moulds of lupins during vernalization treatment of the seed. Cluster planting of kok-saghyz and summer planting of potatoes, as recommended by Lysenko, were tried with good results.

(Academy of Sciences of the Azerbaĭdžan SSR).
(pp. 94–98).

The report of the president included notes on the acclimatization of the wild essential oil plant, *Carpopodium*, found in some districts of Nahičevan ASSR. The plant showed resistance to drought, pests and diseases and was noted for its indehiscent seed, which contained more essential oil and linalool than the cultivated *Coriandrum*.

(*Academy of Sciences of the Georgian SSR*).
(*pp. 99–103*).

The report of the secretary contained reference to changes in the programme of the Section for Agricultural Sciences so as to conform with the teachings of Mičurin, Dokučaev and Williams. An important aspect in the work with cereals was the study of the methods for cultivating the branching Kahetinskaja [Kahetian] wheat and crossing of this wheat with other Georgian wheats. In eastern Georgia Kahetinskaja was more productive than any of the local standards, yielding over 40 c. per ha. in some districts. Hybrid seed from Kahetinskaja x local varieties was obtained. In western Georgia similar work with Kahetinskaja was conducted at the Adžametskaja Research Station for Field Crops.
The method of planting potatoes with vernalized tubers in summer resulted in a partial control of the diseases caused by *Verticillium*, *Fusarium*, *Colletotrichum* and *Rhizoctonia* and in increased productiveness.
Breeding lemons for resistance to mal secco is planned at the Institute for Plant Protection.
At the Institute of Viticulture and Wine Making new varieties of vines were obtained by Mičurinite techniques. Special reference is made to a hybrid between Cicka [Teat] and Chardonné, which is more productive and earlier than Chardonné.

(*Academy of Sciences of the Armenian SSR*).
(*pp. 104–07*).

The president mentioned two new varieties of wheat bred at the Institute of Genetics. The variety Artamati is at present grown in place of all other varieties previously cultivated in the Ararat Valley. The other variety, Egvardi, does well in the foothills.
New varieties of vines have been obtained by Mičurinite methods.
New bread yeast races have been selected at the Microbiological Institute. The yeasts are used extensively at Erevanj.
For the reviews of the reports from the remaining five Soviet republics see Abst. 43.

8. Razumov, V. I.
(Academician T. D. Lysenko and his teaching on phasic development in plants).
Priroda (Nature) 1949 : No. 3 : 30–38.

Some of Lysenko's agrobiological methods which are of economic importance in Russia, are listed, and his theory of phasic development is discussed, with special reference to its influence upon Mičurinite views on plant genetics and related sciences.

9. Simonov, I. N.
(Mičurinite agrobiology and the higher agricultural schools).
Agrobiologija (Agrobiology) 1950 : No. 3 : 21–25.

Changes in Soviet agricultural education since the 1948 session of the Lenin Academy of Agricultural Sciences (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2000) are reported. The principal innovations are the introduction of courses on Darwinism in all agricultural schools and universities and the propagation of the teachings of Williams and Mičurin. Most text books were revised, including Jurjev's manual on breeding and seed growing, Maximov's on plant physiology, Žukovskiĭ's on botany, Fedorov's on microbiology and Eĭtingen's on forestry.
Lectureships were made available to Mičurinites at various institutes. Lysenko and Stoletov were appointed to the Timirjazev Agricultural Academy, Oljšanskiĭ to the Odessa Agricultural Institute and Venjjaminov to the Voronež Agricultural Institute.
Reference is made to new varieties of economic plants selected at several Soviet institutes. A new spring wheat Lutescens 589 and new potato varieties Kazanec [Kazanj] and

Vegetative Hybrid 1 were selected at the Kazanj Agricultural Institute, and released to the industry.
New productive varieties of winter wheat and millet were developed at the Kuĭbyšev Agricultural Institute and released to growers.
A new variety of sunflower, ISHI, was selected at the Irkutsk Agricultural Institute. It is being tried on an industrial scale.
Breeding work at the Kišenev Agricultural Institute has given several new varieties of economic plants. The winter wheat Dorešti 32 was improved at the institute.

10. Li, C. C.
Genetics dies in China.
J. Hered. 1950 : **41** : p. 90.

An extract of a letter by C. C. Li is given, in which he reports the suspension of Mendelian genetics at the College of Agriculture of the National Peking University.

11. Tschermak-Seysenegg, E.
Der Bauernsohn Johann Gregor Mendel als Begründer der Vererbungsforschung. (**The peasant's son Johann Gregor Mendel, founder of the science of genetics**).
Bodenkultur, Wien 1950 : **4** : 121–24.

A concise account is given of Mendel's life and work as the founder of genetics.

12. Gluščenko, I. E.
(**A great geneticist and plant breeder**).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1948 : No. 11 : 37–50.

The use of mentors and pollen mixtures, vegetative rapprochement and the technique developed by Mičurin for selecting useful plant material at an early stage of growth, are regarded as the most important of Mičurin's plant breeding methods. Several varieties of fruits bred by Mičurin are listed. These include apricot, cherry and *Actinidia* varieties.

13. Isaev, S. I.
(**The founder of Soviet agrobiology**).
Agrobiologija (Agrobiology) 1950 : No. 3 : 3–11.

Mičurin's theoretical and practical contributions to Soviet Darwinism and materialist agrobiology are recapitulated in considerable detail.

14. Simonov, I. N.
(**For an improved training of the students at the higher technical colleges in fruiticulture and vegetable growing**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 3–7.

Changes in agricultural education involving the abandonment of formal genetics and its replacement by Mičurinite agrobiology are urged.
The work of several Soviet scholars and plant breeders is criticized from the Mičurinite viewpoint.

15. BEHR, I.
Books and special volumes in the field of genetics, 1939-1949.
Heredity 1950 : **4** : 249–57.

A list is given of publications on plant and animal genetics which appeared in various countries during the period 1939–49.

16. RAMSBOTTOM, J.
The International Botanical Congress at Stockholm.
Nature, Lond. 1950 : **166** : 419–22.

An account is presented of the International Botanical Congress held at Stockholm during July, 1950. The proceedings of the Congress were divided according to 15 sections, which included a section on Cytology and one on Genetics, with C. D. Darlington and Ö. Winge as president, respectively. Communications by the delegates from the Soviet Union comprised: hybridization of plants by grafting, I. E. Glyschenko [Gluščenko]; the directed influence of phytopathogenic viruses on plants, K. S. Suchov [Suhov]; new experiments elucidating the nature of fertilization, N. V. Turbin; the nature of hybrid plants, V. N. Stoletov; cultivated plants during extreme conditions of life, P. A. Baranov; and V.N. Soukatchev [V. N. Sukačev] on the exploration of the vegetation of the Soviet Union

17. STERN, C.
Boveri and the early days of genetics.
Nature, Lond. 1950 : **166** : p. 446.

Punnett's statement in his account of "Early days of genetics" (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1307) that the discovery of genetic linkage was retarded by the influence of Boveri's paper "On the individuality of the chromosomes" is criticized. Quotations are given from Boveri's work in support of the view that he not only interpreted the theory of the individuality of chromosomes widely enough to include exchanges of chromosome parts but also explicitly predicted the discovery of genetic linkage and crossing over and their cytological basis.

18. SONNEBORN, T. M.
Heredity, environment and politics.
Science 1950 : **111** : 529–39.

The scientific basis of the new Soviet genetics is critically examined. The aspects discussed include the results of recent investigations by Sonneborn and his colleagues on the genetics of *Paramecium*; the conclusion is reached that work on cytoplasmic inheritance, sometimes cited in support of Lysenko, yields results in fundamental opposition to his views.

19. MARLAND, A. G.
(Conference on the position of biological teaching at the Tartu State University).
Priroda (Nature) 1949 : No. 2 : 78–79.

At a meeting held at Tartu, Estonia, between 16 and 18 September, 1948, the teaching of biology at the University was critically examined in the light of Lysenko's report (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2000). The meeting was opened by A. Koort, after which a report was read by A. Vaga. Formal genetics, bourgeois idealism and racial theories were rejected. Several scientists were named as guilty in this respect. Juprus

and Norman were criticized for racialist bias, and Liĭk, Poska-Teĭs and Aulj were criticized for teaching formal genetics. Texver, Karu Sutter and other speakers admitted their former errors due to the influence of formal genetics.

20.

Genetical Society of Great Britain. Symposium on biochemical genetics. Abstracts of papers read at the hundred and second meeting held at University College, London, 29th to 31st March, 1950.
Heredity 1950 : **4** : 267–73.

Among the papers read were the following:—

Haldane, J. B. S. *Introduction to symposium on biochemical genetics.* (*p. 267*).

Biochemical geneticists are confronted with four main problems: the secondary effects of gene differences, e.g. physiological effects; the primary action of genes; the agencies causing mutation; and the biochemical nature of genes and their mode of reproduction. The same problems are involved in the investigation of self reproducing units not attached to the chromosomes, whether or not these units are gene controlled.

Wright, S. *Dominance and factor interaction with special reference to pigmentation of the guinea-pig.* (*pp. 267–68*).

The interactions of the factors for colour in the guinea-pig were used to illustrate the general problem of interpretation of data. The roles to be attributed on the one hand to merely quantitative differences in the actions of alleles on rates of reaction, and, on the other, to persistence of allelic specificity in the chain of reactions, were considered. In the case of the former, two extreme modes of action were compared: (1) reactions in which either the gene controlled agent or its substrate is a severely limiting factor, and (2) multiplicative reactions, in which the rate of reaction depends jointly upon the activity of the gene controlled agent and concentration of substrate. It was concluded that both persistent specificity and effects merely upon rate of reaction must be considered.

Gordon, C. *The effects of specific nutritional factors on gene exhibition in mutants of* Drosophila melanogaster. (*p. 269*).

A number of specific substances affect the expression of mutants without antennae, some inhibiting their expression while others encourage it. One of these inhibitors is vitamin B_2. There are also a number of modifying genes affecting expression; it is possible that these can be identified and related to specific substances. The expression of some other mutants in *D. melanogaster* may be determined in a similar manner.

Westergård, M. *Some aspects of reverse mutations in a biochemical mutant of* Neurospora. (*p. 269*).

In an adenineless strain of *N. crassa* which back-mutates spontaneously to the wild type, growth has been studied in order to discover how the reversion rate is influenced by physical and chemical agents; the results were discussed in relation to concepts of gene mutation.

Catcheside, D. G. Neurospora. (*pp. 269–70*).

The view was expressed that all biochemical mutations of Mendelian genes so far examined result in impairments of single metabolic reactions; requirements more complex than those

met by single added nutrients are the result of inhibitions in turn due to the abnormal accumulation of intermediate products of normal metabolism or their derivatives. The mutant alleles result in the production of enzyme systems either unable to catalyse the reactions controlled by the corresponding wild type alleles, or able to do so only under restricted or special conditions, which include restricted ranges of temperature and pH, isolation from normal cell conditions and alterations of residual genotype. There is no case of a mutant allele able to control a reaction different from that controlled by the wild type alleles.

Fincham, J. R. S. — *Amination-deficient mutants of* Neurospora. (*p. 270*).

Two mutant strains of *N. crassa* were reported, lacking the ability to synthesize α-amino groups from ammonia and probably due to mutation at the same locus; the bearing of these mutants on the general problem of amino acid synthesis was discussed.

Pontecorvo, G. — *Biochemical genetics of* Aspergillus nidulans. (*p. 270*).

Information was presented on the biochemical behaviour of several mutants of *A. nidulans*.

MacDonald, K. D. and Pontecorvo, G. — *An efficient technique for the isolation of auxotrophic mutants of micro-organisms.* (*pp. 270–71*).

The conidia of mutants of *A. nidulans* with multiple growth factor requirements survive longer in a medium without these growth factors than conidia from strains with single requirements. The differential survival has been used in developing a technique for the isolation of auxotrophic mutants. The results obtained after irradiation of a biotinless strain with an X-ray dosage of 50,000 r. show that the proportion of double or multiple auxotrophs rises from about 3% of all the colonies when the complete medium is added immediately after plating, to about 40% when the complete medium is added after 140 hours. Altogether, 22 vitamin, 13 nucleic acid and 35 casein requiring mutants have been isolated by the technique. The mechanism of differential survival, which may have evolutionary significance, is being investigated.

Beale, G. H. — *Antigen variation in variety* 1 *of* Paramecium aurelia. (*p. 271*).

Contrary to expectation, varieties 1 and 4 of *P. aurelia* showed similar behaviour as regards antigenic variations. Subsidiary differences were however apparent, e.g. in variety 1 it appeared that each antigenic type within a stock had its characteristic optimum temperature.

Fyfe, J. L. and Chakravarty, A. K. — *Cyanogenesis in white clover.* (*p. 272*).

The occurrence of aberrant ratios, unexpected types in hybrid progenies, and difficulties in classifying certain individuals suggest that the genetical explanation found in the literature on cyanogenesis in white clover is not yet complete. Data from population studies, hybrid progenies and repeated tests of individuals obtained at the Cambridge School of Agriculture, are mentioned.

Auerbach, C. and Moser, H. — *An analysis of the mutagenic action of formalin.* (*pp. 272–73*).

Mutations induced in *Drosophila* by formalin comprise lethals, visible types, and small and large chromosomal rearrangements; delayed mutations are frequent.

Bird, J. *The production of mutations in* Drosophila *using two classes of compounds, the "aromatic nitrogen mustards" and the epoxides.* (*p. 273*).

The following compounds were tested for their mutagenic action on *D. melanogaster:* NN-di-(2-chloroethyl)-*p*-toluidine, NN-di-(2-chloroethyl)-*p*-anisidine, β-naphthyldi-(2-chloroethyl) amine, β-naphthyldi-(2-chloropropyl) amine (mixture of isomers), 1 : 2,3 : 4-diepoxybutane. In feeding experiments all five compounds produced a small but significant increase in rate of lethal mutation.

21. Flerov, A. F. and
Flerov, V. A.
(The development of flowers from the leaves of the garden onion).
Priroda (Nature) 1949 : No. 2 : 62–63.

In Russian experiments, artificial removal of onion scapes resulted in the leaves producing supplementary inflorescences. The phenomenon is interesting when it is viewed in the light of Lysenko's theory of phasic development. Moreover, the observations disprove the Weismannite hypotheses on the "specialization and continuity of embryonic plasma," since they provide a good example of the development of the reproductive organs from vegetative portions of the plant.

22.
The birth of genetics. Mendel—De Vries—Correns—Tschermak.
Genetics (Suppl.) 1950 : **35** : No. 5 : Pp. 47.

English translations are presented of the letters of Mendel to Nägeli, written between 1866 and 1873, and the papers in which De Vries, Correns and Tschermak announced their genetical findings.

23. Fisher, R. A.
A class of enumerations of importance in genetics.
Proc. Roy. Soc. 1949 : **136** : Ser. B : 509–20.

"A number of enumerations arising in genetics, e.g. of sets of isomorphic genotypes, of modes of gamete formation, of the modes of formation of ordered and unordered tetrads, etc., have been found in previous work to yield solutions expressible as the mean powers of arbitrary degree of appropriate series of bases. These are such as to yield integral values of the mean for all integral exponents.
The general combinatorial theorem governing this class of enumeration is given in § 2. Other sections illustrate the method in operation by confirming and extending the genetic formulae so far established.
In § 3.1 is a brief discussion of a partitional function which serves to enumerate the numbers of partitions of any partible number in a lattice of arbitrary dimensionality."
[Author's summary.]

24. Hanson, W. D. and
Kramer, H. H.
The determination of linkage intensities from F_2 and F_3 genetic data involving chromosomal interchanges in barley.
Genetics 1950 : **35** : 559–69.

A method is developed for obtaining linkage values from F_2 and F_3 segregation data involving interchanges, and a means of combining the data is indicated. Data from a study

involving the segregation of partial sterility due to a chromosome interchange and certain qualitative factor pairs in barley are used to illustrate the method. By using the gene pair *Xc xc*, affecting seedling lethality, as a genetic marker it was possible to show that the chromosome carrying linkage group VI was involved in the interchange.

25. LAMM, R.
Linkage calculations from semi-sterility data.
Hereditas, Lund 1950 : **36** : 457–69.

The application of the method of maximum likelihood for calculating linkage from semi-sterility data obtained from pea crosses involving types carrying a segmental interchange is discussed. Tables are given of scores for linkage data from translocation back crosses and intercrosses. An example is worked out from data provided by the Thibet 7 translocation.

26. JOHNSON, L. P. V. and
UNRAU, J.
A system of backcross designations for use in plant breeding.
Agron. J. 1950 : **42** : p. 459.

The system of back cross designations in use at the University of Alberta is explained. It is hoped that a standard system may eventually be universally adopted, and that this system or some modification of it might be considered in that connexion.

27. BOAVENTURA, F. T.
Uma nova técnica de melhoramento. (**A new technique of plant breeding**).
Agron. Angol. 1950 : No. **3** : 27–30.

When two or more single genes from different parents, say B, C and D, are to be transferred to an improved variety A, it is recommended that the following procedure be adopted:— (1) Cross A x B, A x C, A x D. (2) Back-cross each family to A for two generations, then self to isolate satisfactory segregates. (3) Cross the selected segregate from A x B with that from A x C, and cross the F_1 of this cross with the segregate from A x D, and then select the required type from the resulting progeny.

28. ALLAN, H. H.
Some ecological aspects of natural hybridism in New Zealand plants. Report of the Sixth Science Congress, May 20-23 (inclusive) 1947.
Trans. Roy. Soc. N.Z. 1949 : **77** : p. 186. (Abst.).

The results of the bringing together by man's influence, of plants capable of hybridization are discussed. There is evidence that long isolation does not necessarily produce sterility barriers.

29. BAKER, H. G.
The inheritance of certain characters in crosses between *Melandrium dioicum* and *M. album*.
Genetica 1950 : **25** : 126–56.

An account is given of a genetical study carried out to discover suitable characters for the diagnosis of interspecific hybridization.

30. Dilleman, G.
L'examen du pollen et la reconnaissance des hybrides naturels. (**The examination of pollen and the detection of natural hybrids**).
Bull. Soc. Bot. Fr. 1950 : **97** : 98–99.

By examination of morphological characteristics and the staining reaction of the pollen in various species and interspecific hybrids of *Linaria, Ribes, Digitalis, Pyronia* and *Sambucus* it has been found possible to detect the forms that are natural hybrids. The staining reaction has proved as effective with dried herbarium material as with freshly gathered plants. Back cross hybrids of *Linaria* could also be distinguished.

31. Piza Jor., S. de T.
Dissecando o gen. (**Analysing the gene**).
An. Esc. Sup. Agric. "Luiz de Queiroz," S. Paulo, 1947 : **4** : 102–67.

A general criticism is presented of the theory of the corpuscular gene, and the author proposes in its place the theory that the fundamental properties of organisms are not a result of gene action, the genes merely modifying characters formed independently. The genes themselves are regarded not as separate entities but as specific functions of whole chromosomes. In the course of his discussion the author criticizes as inadequate the notion of gene action by the interaction of products diffused into the cytoplasm, the common interpretation of position effects, the notion of mutation as a chemical change, the analogy frequently drawn between genes and enzymes, and theories of gene interaction involving modifiers introduced to cover cases where simpler genetic interpretations break down. The author believes that the course of embryological development in many animals, phenocopies, and plant galls illustrate the relative unimportance of genes in many types of development. Chromosome pairing is believed to be similar in many ways to conjugation between ciliates.

32. Komai, T.
Semi-allelic genes.
Amer. Nat. 1950 : **84** : 381–92.

The characteristics and occurrence of semi-allelic genes in *Drosophila* and other animal organisms are surveyed. Semi-allelic genes are defined as genes with similar phenotypic effect, located on the chromosome in direct sequence; crossing-over, if any, occurs between such genes with very low frequency. Semi-allelic genes may also be distinguished from true allelic genes by the fact that the heterozygote approaches the wild type more than either homozygote. Such genes are widely distributed in animals. Probably the different cases of semi-allelic genes vary in the nature of their chromosomal bases.

33. Goldschmidt, R. B.
"Repeats" and the modern theory of the gene.
Proc. Nat. Acad. Sci. Wash. 1950 : **36** : 365–68.

In a discussion of the phenomenon of "repeat" genes in *Drosophila* observed by Green and Green and other investigators, the view is expressed that the occurrence of such loci cannot be explained on the basis of the classical concept of the gene, but in terms of a more modern hypothesis on the nature of hereditary units, proposed by the author. Sections of different size, containing a number of bands in the salivary glands, are regarded as the real genetical units of the chromosome; any genetical event in such a section produces a mutant effect of the same kind and these effects behave as multiple alleles.

34. Waris, H.
Cytophysiological studies on *Micrasterias* II. The cytoplasmic framework and its mutation.
Physiol. Plantarum, Copenhagen 1950 : **3** : 236–46.

A mutant lacking bilateral symmetry is discussed. It may give rise by further mutation to the normal form. It is thought probable that the mutation is due to a permanent alteration in the cytoplasm, not wholly controlled by the nucleus.
Cells denucleated by centrifuging develop a common basic structure characteristic of the species. Observations on such cells are all consistent with the view that there is, in the cytoplasm of desmids, a basic framework which, independently of the nucleus, determines the bilateral symmetry of the new semicells, the degree of differentiation being dependent however on nuclear action.

35. Wright, S.
Genetical structure of populations.
Nature, Lond. 1950 : **166** : 247–49.

The article is the substance of the Galton lecture delivered at University College, London, in June, 1950. The genetic aspects of population structure are discussed under the headings: inbreeding coefficient, factors of evolutionary change, population structure in evolution, ecological opportunity, and evolution in general.

36. Lefevre, G. (Jun.)
X-ray induced genetic effects in germinal and somatic tissue of *Drosophila melanogaster*.
Amer. Nat. 1950 : **84** : 341–65.

No reverse mutations in either germinal or somatic tissue were induced by X-ray treatment. The X-ray induced mutability of locus w^+ was not significantly affected by the kind of cell in which it was located. Evidence was obtained that the process of X-ray induced mutation and that of spontaneous mutation in *Drosophila* are qualitatively different. Probably mutation induced by ionizing radiation involves the loss or destruction of genetic material. Unlike spontaneous mutations, induced mutations are incapable of further change.

37. Ives, P. T.
The importance of mutation rate in evolution.
Evolution, Lancaster, Pa. 1950 : **4** : 236–52.

A gene in chromosome II of *Drosophila melanogaster* causing a high rate of mutation in other genes was discovered in a natural population. It produces mutations in many other genes at an average rate of ten times the normal rate when homozygous and two to seven times the normal rate when heterozygous. Modifying factors affect both the dominance of this gene and duration of its activity in the production of sex-linked mutations. The major effect of the gene is in the germinal tissue where it produces both lethal and visible mutations at a ratio of approximately 8 : 1. Inversions are also produced. Some evidence was obtained that many genes for high mutation rate occur in natural populations. The evolutionary significance of such genes is discussed. The hypothesis is put forward that mutator genes are the major cause of both gene mutations and inversions in natural populations and that the majority of so-called spontaneous mutations are caused by the biochemical activity of genes for mutation rate.

38. KAPPERT, H.
Aktuelle Probleme der Genetik. (**Present problems of genetics**).
Deutsche Akad. Naturforscher "Leopoldina," Berichte Sitz. Akad. geh. Vorträge 1948 (1950) : 10–13.

The question of the unalterable nature of the gene is discussed with reference to the work of Mendel and Nilsson-Ehle. A summary is given of the theory of Sirks to explain polymeric segregations by the changes produced in a single gene molecule through several intermediate stages, characterized by the presence of different numbers of side chains. Oehlkers' experiments on *cruciata* characters in *Oenothera* are shown to support the hypothesis of the mutual influence of different allelemorphs of a gene. The question of the actual process involved in this mutual alteration is still unsolved. It is suggested that in the case of two different allelemorphs, of equal or different potencies, competition in regard to assimilation of substances needed for reproduction may play a role. Such competition between genes is so far unknown, but the behaviour of viruses X and X^1, when used simultaneously and in sequence, in the infection of the potato, is considered to be analogous.
Studies of mutation have led to the theory of the gene as a complex protein molecule, which can reproduce itself and, like an enzyme, make possible interaction between certain substances in the cell. Goldschmidt, on the other hand, considers the chromosome to be the ultimate genetic unit. The role of deletions in mutation processes is discussed and the recent work of American authors shows that a large number of mutations consist in loss of the capacity to promote quite simple reactions.
The possibility of directing variation is another problem mentioned, but not discussed.

39. HARTE, C.
Mutationsauslösung durch Ultrakurzwellen. Erste Mitteilung. (**Induction of mutations by ultra-short waves. First Communication**).
Chromosoma, Wien 1950 : **3** : 440–47.

As a form of radiation constantly present in the environment of living organisms, ultra-short electromagnetic waves (λ = 1 cm - 20 m) seemed to the author a suitable object for experiment with reference to their influence upon meiosis.
Experiments on the treatment of inflorescences of an *Oenothera* hybrid with such waves, with a field strength of 1·5 Volt/m for 15 minutes, showed that large numbers of mutations had been induced. The chromosome anomalies observed are recorded in detail.

40. REGEHR, H.,
ARNASON, T. J. and
JOHNS, H. E.
Induction of mutation by high-energy X-radiation produced by a 23- MeV. betatron.
Nature, Lond. 1950 : **166** : 228–29.

A preliminary investigation has been made of the frequency of recessive sex-linked lethal mutations induced in *Drosophila melanogaster* by X-irradiation produced by the betatron operating at 23 MeV. The high energy radiations were found to be only 0·59 as efficient as ordinary X-rays for the production of lethal mutations. The reason for the difference in effectiveness of high and low energy X-irradiation lies in the difference in the distribution of ionizations in the irradiated material. High energy electrons have longer tracks and produce sparser ionization on the average than do low energy electrons. Since two or more ionizations in close proximity may be required for the production of lethals, a lower frequency of such mutations may be expected as a result of treatment with high energy X-irradiation.

41.

Gli agenti mutageni. **(Mutagenic agents).**
Publ. Staz. Zool. Napoli 1950 : **22** : Suppl. 1–200.

Auerbach, Ch. *Differences between effects of chemical and physical mutagens.* (*pp. 1–21*).

Chemical substances with mutagenic effects are cited. The most potent chemical mutagens so far discovered are the sulphur and nitrogen mustards; their effects are strikingly similar to those of X-rays, comprising both genic mutations and large and small chromosomal rearrangements. Sex-linked lethal mutations produced in *Drosophila* by treatment with mustard gas include approximately the same percentage of small deficiencies as lethals induced by X-rays and are scattered along the X chromosome in a similar manner. Certain differences have however been noted between the effects of mustard gas and X-rays; with more suitable techniques for the detection of differences, the general similarity in the effects of the two agents might become less pronounced. In *Drosophila* the main differences are as follows: (1) a peak of sensitivity to the genetical action of mustard gas occurs during the development of the male germ cells but with X-rays the peak is shown in mature spermatozoa; (2) among mutations induced by mustard gas there is a relative shortage of large rearrangements, particularly translocations; and (3) mustard gas treatment results in a mutagenic after-effect. This after-effect was revealed in an investigation of mosaicism in the F_1 and F_2 of males and females of *Drosophila*. Formalin may also exert a mutagenic after-effect; other chemical mutagens have not yet been examined from this aspect.

Darlington, C. D. *Physical and chemical breakage of chromosomes.* (*pp. 22–31*).

Studies by the author and other investigators on the mechanism of chromosome breakage induced by chemical and physical agents are discussed. Induced breakage depends upon the effects produced in the protein and nucleic acid of the chromosomes. The two components react differently according to the stage of the chromosome cycle at which treatment occurs, the part of the chromosome broken and the agent used. Treatment with physical and chemical agents succeeds in breaking down the ultimate units of normal behaviour, the chromatids, revealing their polypeptide constituents or monid structure; the treatment may also change the usual size of the metaphase chromosomes and perhaps even give rise to delayed mutation.
All chromosome breakage, even spontaneous breakage, is associated with abnormalities of the nucleic acid attachment of the chromosomes. The nucleic acid is attached to the outside of the chromosomes, forming a coat to them; chromosome breakage is hindered by the coat and facilitated by its removal; the reverse holds in the case of reunion. Comparison of the results of breakage arising in different ways leads to the inference that a general abnormality of the cell occurs which is proportionate to the amount of breakage; thus the cytoplasm must be the seat of the abnormality imposed upon the nucleus and chromosomes by the various agents. On these grounds criticism is made of the target theory put forward by Lea in which directness of action of radiations in breaking chromosomes is assumed.

Hadorn, E. *Weitere Ergebnisse der* "in vitro-*Behandlung*" *von* Drosophila-*Ovarien mit Phenol.*
(*Further results of* "in vitro *treatment*" *of* Drosophila *ovaries with phenol*). (*pp. 32–49*).

This paper discusses (1) the question of technique; (2) the validity of the demonstration of the mutagenic action of phenol solution; (3) the problem of the specificity of phenol action for certain chromosome loci, and (4) the occurrence of weak mutants i.e. subvital factors. As regards (3) the writer suggests that probably many loci exhibit a specific susceptibility to phenol, i.e. the specificity of phenol is not selective in the narrow sense.
Though no conclusions could be drawn as to the underlying mechanism, observations on the different stability of 51 balanced strains of phenol mutants are recorded.

In phenol experiments the probability of mutation increases with the degree of ovarian injury caused by the treatment (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2307). The occurrence and incidence of subvital mutants was also investigated statistically.

Ephrussi, B. — *Induction par l'acriflavine d'une mutation spécifique chez la levure.* (*Induction of a specific mutation in yeast by means of acriflavin*). (*pp. 50–64*).

The writer recorded how treatment of *Saccharomyces cerevisiae* with acriflavin resulted in a mutation characterized by a defect in respiration which prevents the utilization of glucose through the respiratory channel. Whether the mutation is cytoplasmic in nature or not, the writer is unable to decide, but he states that it does not seem to be a genic mutation.

Taylor, H. E. — *Biological significance of the transforming principles of* Pneumococcus. (*pp. 65–77*).

Available information on the biological nature of the transforming principles of *Pneumococcus* supports the view that these substances are parts of the genetic material of the bacteria from which they are extracted. The mode of action of the pneumococcus transforming principles, as well as their origin and properties, distinguish these agents from such chemical mutagens as the mustards. Whereas chemical mutagens have been found to be active upon a wide range of organisms, the transforming principles are active only upon certain susceptible strains of *Pneumococcus*, as in the case of the capsular transforming principle. The specificity of a transforming princple and the nature of the properties which render a given strain competent to undergo transformation are two important problems raised by the phenomenon of transformation.

Latarjet, R., Buu-Hoi, N. P. and Elias, C. A. — *Induction d'une mutation spécifique chez une bactérie par des cancérigènes hydrosolubles.* (*Induction of a specific mutation in a bacterium by hydrosoluble carcinogenic substances*). *pp. 78–93*).

Using as a test for detecting mutations the capacity of *Escherichia coli* strain B to mutate spontaneously to form B/1, which is resistant to bacteriophage, T_1, a number of polycyclic hydrocarbons and carbamic acid esters were included in a series of substances examined for their carcinogenic and mutagenic action. The chemical basis of the reactions observed is discussed. It is tentatively suggested that mutagenic substances should have a certain carcinogenic potentiality.

Visconti di Modrone, N. — *Méchanisme de l'action léthale de la moutarde azotée* (*Ny*) *sur la bactérie* Escherichia coli. [*The mechanism of the lethal action of nitrogen mustard* (*Ny*) *on the bacterium* Escherichia coli]. (*pp. 94–113*).

Analysis of the lethal effect of Ny on strain B/2 of *E. coli* shows the mortality rate of bacteria to be proportional to the cyclization rates of the molecules of Ny at the same temperature. Experimental data permit the hypothesis that one bacterium is killed by one molecule of Ny.
Survival curves of strain B and of 11 other strains of the bacterium were recorded after treatments with X-rays, ultraviolet rays, or Ny, and differences in sensitivity were noted.

Vogt, M. — *Urethane-induced mutations in* Drosophila. (*pp. 114–24*).

Urethane has been found to exert a mutagenic effect in experiments on *Drosophila*, which is, however, weaker in comparison with the effects of mustard gas or related substances.

Some of the mutations so far observed were associated with chromosomal deficiencies, but the majority have belonged to the class of point mutations. Among the latter lethal and visible mutants occurred in a ratio similar to the ratios obtained by other authors in the case of control and X-rayed material. No indication has so far been obtained that urethane acts selectively on certain loci.

Battaglia, E. *Nuove sostanze inducenti frammentazione cromosomica.* (*New substances that induce chromosome fragmentation*). (*pp. 125–57*).

The findings already reviewed (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2096) are here discussed and elaborated with special reference to the action of methylene blue and toluidine blue on chromosome breakage in *Allium Cepa* root tips. Problems receiving special attention in the main argument and the subsequent discussion were: the mechanism of the induction of chromosome mutations, types of chromosome aberrations produced, recovery tests and the difference between physical and chemical mutagenic agents.

D'Amato, F. *The chromosome breaking activity of chemicals as studied by the* Allium cepa *Test.* (*pp. 159–70*).

Experiments have been carried out by the author on chromosome breakage induced by treating root meristems of *A. Cepa* bulbs with benzedrine, acenaphthene, 9-aminoacridine and phosphine 5G. The threshold values of this mutagenic action, the optimum concentrations and durations of treatments have been established. Among the four substances used benzedrine induced the least amount of chromosome breakage. Of particular interest is the effect of chromosome breakage recently observed with acenaphthene. Due to the slowness of the action of the substance breaks can occur in both diploid and polyploidized nuclei.

In the study of chemically induced chromosome aberrations special attention has been given to pseudochiasmata, "pulverization" of the chromosomes at anaphase, effects upon the centromere leading to misdivision of chromosomes and chromatids, and translocations involving the formation of dicentric chromatids resulting from one-hit chromatid breaks and subsequent reunion. The occurrence of pseudochiasmata is explained on the basis of one-hit chromatid aberrations followed by reunion, at only one point, of all the four broken ends.

Among the mutagenic chemicals studied by different investigators only mustard gas induces a marked frequency of reunions; in the case of other such chemicals the main effect of their chromosome breaking activity is deletion, the reunion of broken ends or translocation being exceptional. It is suggested that this feature results from two characteristic properties of most substances: the slowness and incompleteness of their action.

Finally some reference is made to work by Gustafsson and the author and the experimental control of the mutation process by the combined influence of chemical pretreatment and X-radiation (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 933).

Buzzati-Traverso, A. *Perspectives of research on mutagens.* (*A discussion with the participants in the symposium*). (*pp. 171–86*).

Led by A. Buzzati-Traverso, the symposium culminated in a general discussion in which the following aspects were considered: problems of the qualitative and quantitative analysis of the induction of mutations by chemical agents, the hit theory, ratio of genic to chromosomal mutations, healing of breaks, isochromatid breaks, delayed mutations and the combined action of different mutagenic agents.

42. Clark, J. B.,
Wyss, O. and
Stone, W. S.
Induction of mutation in *Micrococcus pyogenes* by chemical inactivation of sulphhydryl groups.
Nature, Lond. 1950 : **166** : 340–41.

The results of recent investigations suggest that in the induction of mutations one vulnerable point may be the sulphhydryl groups of the gene protein. Experiments have been made by the authors to determine whether naphthaquinone can induce antibiotic resistant mutants in *M. pyogenes* var. *aureus* and to determine whether any mutagenic effect is due to inactivation of sulphhydryl groups. Addition of menadione (2-methyl, 1-4 naphthaquinone) dissolved in acetone to the nutrient broth resulted in the induction of mutants resistant to streptomycin and penicillin. Cysteine and other compounds containing sulphhydryl groups were found to interfere with the mutagenic activity of menadione. Sublethal concentrations of heavy metal salts did not exert any mutagenic effect. It therefore appears that the mutagenicity of menadione is not due to a mere inactivation of sulphhydryl groups in the protein component of the nucleoprotein or in an enzyme essential for gene multiplication but is a more complex process. Compounds may react with the same groups in the cells but with different effects on non-specific mutations; investigations based upon the fact may eventually lead to a procedure for securing specificity in mutagenic action.

43.
(The results of the scientific research work of the academies of the Soviet Republics for the year 1948. Part II).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 8 : 34–52.

(*Academy of Sciences of the Uzbek SSR*).
(*pp. 34–37*).

The president referred to experiments on vegetative hybridization of cotton and to Mičurinite training of cotton for resistance to soil salinity. The first and second seed generations of vegetative grafts behaved like sexual hybrids. The effect of low temperatures upon germinating seed of different varieties of cotton is being studied. Collections of wild fruit trees and small bush fruits were made. Several new varieties of apples and pears were selected.

(*Academy of Sciences of the Kazah SSR*).
(*pp. 38–41*).

I. G. Galuzo mentioned adaptation work with *Apocynum* grown for fibre and with plants grown for medicinal uses including *Salvia, Hypericum* and *Matricaria* spp.

(*Academy of Sciences of the Lithuanian SSR*).
(*pp. 42–44*).

The principal fungi causing bunt and smut disease in cereals were studied.

(*Academy of Sciences of the Latvian SSR*).
(*pp. 45–49*).

Practical application of the Williams complex system to Latvian agriculture was reported.

(*Academy of Sciences of the Estonian SSR*).
(*pp. 50–52*).

Mention is made of the study of the existing local fruit trees, as a result of which some hardy pears, cherries and hazels have been selected.

44. Enikeev, H. K.
(The growth of Mičurinite science in the sphere of horticulture).
Agrobiologija (Agrobiology) 1950 : No. 3 : 26–37.

Major achievements in acclimatization and breeding work with fruit trees and bush fruits in the principal geographical zones of the USSR, in the last 15 years, are discussed, with special reference to the role of Mičurinite methods. Mičurin is frequently cited and some of his breeding work referred to.
Notes are attached on bud mutations, clonal selection, and spacing of trees in the orchard in conformity with Lysenko's teaching on the absence of competition between young trees of the same species

The Siberian Zone
Mention is made of 230 new productive varieties of apples, pears, plums and currants, which were selected at various breeding institutes in the Urals, Siberia and the Soviet Far East.

Povolžje
Hardy large-fruited apple varieties, plums, cherries and cherry-plum hybrids were bred at the Kuĭbyšev Fruit Research Station. They are adapted to the severe continental climate of central Povolžje. The plum varieties were obtained from crosses between the cultivated plums and the hardy sloe or *Prunus insititia*. Good quality strawberry varieties adapted to local conditions were developed at the Saratov Fruit Research Station.

The Central Black-Earth Zone
New varieties of fruits selected at the Central Genetical Laboratory and at the Mičurin Scientific Research Institute of Horticulture included good quality, hardy apples with different dates of maturity. New pears were derived from crosses between the southern varieties and Mičurin's pears or the Ussuri pear. They bear good quality fruits and are adapted to the Tambov province. The mentor method was used in breeding pears to improve their hardiness and the appearance and quality of their fruits. Vegetative rapprochement reduced partial sterility in crosses between some plums. The hybrids thus obtained were hardier that those from non-sterile crosses without vegetative rapprochement. The role of the female parent in breeding apples and plums for hardiness and good quality fruit was studied. Reference is made to new varieties of apples, pears and apricots selected at the Voronež Fruit Research Station.

The Central Non-Black-Earth Zone
Breeding results with fruits at the Moscow Fruit Research Station are reported. The varieties of fruits selected at the institute include 28 standards for the central belt of the USSR.
The productive new raspberries Standart, Urožaĭnaja [Productive], Sovetskaja [Soviet] and Russkaja [Russian], yielding up to 40 c. per ha., were obtained by distant hybridization of English varieties with central Russian varieties.
New promising varieties of black currant were bred from Siberian forms x west European varieties.
West European strawberry varieties have been largely superseded in the non-black-earth zone by the more productive and adaptable varieties bred at the research station. The new varieties are: Komsomolka [Komsomol], Mysovka [Bay], Obiljnaja [Abundant], Pionerka [Pioneer], Negritenok [Piccaninny], Krasavica Zagorjja [Ultramontane Beauty] and Pozdnjaja iz Zagorjja [Late Ultramontane].

The North-Western Zone of the USSR
Over 60 new hardy varieties of apples, plums, cherries, raspberries, gooseberries and strawberries were bred by Mičurinite methods at a branch station of the USSR Institute of Plant Industry. The varieties are adapted to the Leningrad province and neighbouring provinces. Some of the new cherry varieties bear fruits with better flavour than some of the southern varieties.

The White Russian SSR
Selection work with pome and stone fruits at the White Russian Fruit Research Station is mentioned.

The Ukrainian SSR
The scale of the breeding programme carried out at the Ukrainian Scientific Research Institute and its research stations is indicated by the large collection of hybrid material which exceeds 500,000 plants. Mičurinite selection and training gave 19 new varieties of fruits including the apples Renetnoe Mleevskoe [Mleev Reinette], Avgustovskoe [August], Osennee Zolotoe [Autumn Golden], Slava Pobediteljam [Glory to Victors] and Pervomaĭskoe [First May]. Of the new pears, Bergamot Mleevskiĭ [Mleev Bergamotte], and of the cherries, Tavričanka [Tavriz] and Melitopoljskaja Rannjaja [Early Melitopolj] are specially mentioned. All the new varieties yield more and better quality fruits than previously cultivated non-Soviet varieties.

The Southern Zone
The new varieties of fruits bred by Mičurinite methods at the Nikita Botanical Garden included 40 new peaches, 5 cherries, 15 plums, and 8 interspecific hybrids between the cherry-plum and the Japanese plum. The latter hybrids combine the good fruit properties of the Japanese plum with the moderate requirements of the cherry-plum.
New varieties of apricot, cherry, peach and strawberry were selected at the Krasnodar Fruit Research Station and new varieties of apricot, cherry and peach adapted to cultivation in Central Asia were bred at the Samarkand Fruit Breeding Research Station.
Mention is made of hardy citrus fruits bred at the Soči Research Station. These include a hybrid between the Unshiu mandarin and orange and the new orange Apeljsin Sočinskiĭ [Soči Orange] which was selected from Washington Navel and trained as scion on a hardy Unshiu stock.

45. Carmin, J.
News and items.
Bull. Indep. Biol. Lab., Israel 1950 : **6** : Pp. 4.

The Kefar-Malal institution attempts to elucidate the laws underlying the ways in which different environmental factors react upon vital phenomena and bring about changes in constitution of varying hereditary potencies. It also explores the existing interrelations between living organisms. Lists of new and older projects are given. The former include the setting up of a Mičurin plant training and adaptation nursery.

46. Cunha, A. Brito da,
Burla, H. and
Dobzhansky, Th.
Adaptive chromosomal polymorphism in *Drosophila willistoni*.
Evolution, Lancaster, Pa. 1950 : **4** : 212–35.

Natural populations of *D. willistoni* in Brazil and elsewhere were studied with regard to chromosomal inversions. The data obtained suggest that the amount of adaptive chromosomal polymorphism of a population found in any given region is in general proportional to the variety of habitats in which the species occurs in the region.

47. Jepsen, G. L.
Selection, "orthogenesis," and the fossil record.
Proc. Amer. Phil. Soc. 1949 : **93** : 479–500.

Literature on selection and orthogenesis is reviewed with the object of revealing the manifold meanings in which these terms have been used in connexion with paleontological

studies. The bibliographical references cited have been mainly chosen for their topical relevance and their significance in the history of ideas concerning selection and orthogenesis; for this reason many classical and well-known works are not included. The author concludes that paleontology provides more support for the theory of orthoselection that for the concept of orthogenesis.

48. STEBBINS, G. L. (JUN.).
Reality and efficacy of selection in plants.
Proc. Amer. Phil. Soc. 1949 : **93** : 501–13.

An examination of the results of studies on crop plants and wild species by various investigators leads to the main conclusion that natural selection in the higher plants is based upon harmonious adaptive combinations of characters and that the selective value of any individual character largely depends upon its relationship to the other characteristics of the plant. The evolution of angiosperms is discussed in the light of this main conclusion.

49. MAYR, E.
Speciation and selection.
Proc. Amer. Phil. Soc. 1949: **93** : 514–19.

The role of various selective factors in the evolution of species is examined. Natural selection is regarded as being effective at three stages of the process of speciation: (1) it continually moulds all populations of species into adaptation to the local environment; (2) it modifies isolated populations of a species not subject to gene flow from the main part of the species; and (3) it perfects isolating mechanisms after the old and new populations have reestablished contact and eliminates those individuals with imperfect isolating mechanisms of reproduction; it also tends to eliminate individuals which are closest to other sympatric species in their ecological requirements.

50. DIPPELL, R. V.
Mutation of the killer cytoplasmic factor in *Paramecium aurelia*.
Heredity 1950 : **4** : 165–87.

Further investigations on the mutation of κ are reported (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1331). Evidence is given in support of the view that spontaneous mutation of κ and not the gene *k* provides the physical basis for five observed changes of the killer character. Three of the five mutant killèrs have maintained two kinds of κ, presumably in all their descendants, for a period of at least two years; in these the two kinds of κ maintain an equilibrium population; in the case of one of the remaining mutants, however, evidence has been obtained suggesting that this particular mutant form of κ possesses a selective advantage over the original κ.

51. SIMPSON, G. G.
Evolutionary determinism and the fossil record.
Sci. Mon. N.Y. 1950 : **71** : 262–67.

In this brief general review of the types of evolutionary theory, the author discusses the various regularities which the course of evolution has been believed to manifest, and also the extent to which evolution can be regarded as determined or directional.

52. Oparin, A. I.
(Science and the struggle for peace).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 4 : 17–24.

Morgano-Mendelism is rejected because of its concept of hereditary substance and its denial of directed changes other than chance "biological quantum leaps" induced by X-irradiation and similar methods.
From the materialist viewpoint life is a special form of existence of matter, the most characteristic feature of which is metabolism. The idea that inheritance could be determined by any single factor such as the gene or chromosome structure is rejected.
Soviet scientists reject any Malthusian theories.

53. Wright, S.
Population structure in evolution.
Proc. Amer. Phil. Soc. 1949 : **93** : 471–78.

Modes of evolution suggested by the approach of population genetics are surveyed. Consideration is given to the following possible major steps in evolution, from the gene and cell to species of multicellular individuals; modes of transformation of panmictic species and subdivided species comprising many partially isolated local populations; various ways in which a new species can arise from a single species and by hybridization between species; and the evolutionary cycle of genus or species. Data from statistical genetics lead to the conclusion that once the stage of the interbreeding species has been attained, the limiting factor in evolution is not the genetical situation but the ecological pressure due to other species and the inorganic environment.

54.
(In the section of biological sciences).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 6 : 121–26.

The activities included the discussion of the following reports:—

Sisakjan, N. M. (*pp. 121–23*).

The paper dealt with the enzymatic activity of protoplasmic structures. The investigations, which are based upon Oparin's materialist theory on the action of enzymes in live cells, showed that the most vital properties in plant organisms were largely affected by directed changes in metabolism.

Orlov, Ju. A. (*pp. 123–24*).

The research conducted at the Paleontological Institute was critically examined in the light of Soviet Darwinism, which has discarded Morgano-Weismannism and regards the effect of external conditions upon evolution as most important.

Obručev, D. V. (*p. 124*).

Leaps are regarded as stages regularly occurring in evolution and as an outcome of the long preceding history of development of the organisms. They resolve the conflicts between changed environment and organisms not sufficiently evolved to adapt themselves to changed external conditions. Leaps result in the evolution of a new specialized group from an old specialized group. The explanation of leaps by sudden chance mutations producing forms unadapted to their environment is rejected.

Gekker, R. F. (*pp. 24–25*).

Paleoecology is considered as a Mičurinite approach to paleontology.

55. HARTE, C.
Die Anwendung der Varianzanalyse bei der Auswertung zytologischer Untersuchugen. (**The use of the analysis of variance in evaluating cytological investigations**).
Chromosoma, Wien 1950 : **3** : 567–85.

A dissertation is given on the function and value of the statistical analysis of variance as the method which should be applied in testing the validity of differences observed in the investigation of experimental cytological data. The examples chosen to demonstrate the application of the method are drawn from the work reviewed in Absts. 73 and 76 upon the effects of electromagnetic waves and of nutrients upon cell division in root tips of *Vicia Faba*.

56. YASUI, K.
On the extrusion of 'nuclear granules' and their reversible swelling in plant cells, with special relation to the vacuole formation in the cytoplasm.
Cytologia, Tokyo 1941 : **12** : 83–95. [from Jap. J. Bot. 1942 : **12** : Abst. 113].

The extrusion of nuclear granules in living epidermal cells of young anthers, staminal hairs and pollen grains of *Tradescantia canaliculata* is reported. Each granule consists of a central grain and an outer part which swells by water absorption. When the granules approach the surface of the nucleus and the swelling becomes intense the nuclear membrane breaks and the granule is extruded. It then absorbs water in the cytoplasm and develops into a vacuole. It may develop inside an older vacuole and replace it. Vacuoles formed in this way are called n-vacuoles. It is thought that the Golgi apparatus in animal cells may have a certain relationship to nuclear granules or n-vacuoles.

57. DUBUY, H. G.,
WOODS, M. W. and
LACKEY, M. D.
Enzymatic activities of isolated normal and mutant mitochondria and plastids of higher plants.
Science 1950 : **111** : 572–74.

The results of experiments with *Nicotiana Tabacum* and *Lonicera japonica* show that mitochondria and plastids carry all or the greater part of the cytochrome oxidase activity of the cell. The data from *N. Tabacum* also reveal that mitochrondrial mutation can result in marked derangement of certain enzyme systems of the cell and that such abnormalities are apparent in both mitochondria and plastids.

58. YUASA, A.
(Studies in the cytology of Pteridophyta XVIII. Spiral structure of the spermatozoid nucleus).
Proc. Jap. Adv. Sci. 1940 : **15** : 340–43. [from Jap. J. Bot. 1941 : **11** : Abst. 543].

Spermatozoid nuclei of *Isoetes lacustris* treated by the ammonia vapour method swell up and the chromonemata unravel, so that the nucleus is clearly seen to be an assemblage of spiral threads.

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* General studies, see also individual crops.

59. YUASA, A.
(Studies in the cytology of Pteridophyta XXII. The cytological study of *Selaginella uncinata*).
Bot. Mag. Tokyo 1941 : **55** : 324–30. [from Jap. J. Bot. 1942 : 12 : Abst. 117].

The resting nucleus of *Selaginella uncinata* contains one to three plasmosomes with the chromosomes in their interior. At prophase, the reticulum, which contains a little chromatin in the resting stage, receives the chromonemata from the caryosome and develops into the chromatin thread and the chromosomes. At telophase the chromosomes give up the chromonemata into the plasmosome. There are two long, six medium and eight short chromosomes in the diploid complement.

60. NAKAJIMA, G.
Cytogenetical studies in some flowering dioecious plants, with special reference to the sex-chromosome.
Cytologia, Tokyo 1942 : **12** : 262–70. [from Jap. J. Bot. 1943 : **12** : Abst. 182].

Sex chromosomes of the XY type were observed at meiosis in female plants of the following species: *Salix babylonica, S. eriocarpa, Torreya macrosperma, Cercidiphyllum japonicum, Picrasma quassioides, Ilex serrata* var. *sieboldii, Actinidia kolomita, A. polygama, Eurya japonica, Smilax sieboldii* and *Dioscorea japonica.*

61. KUWADA, Y. and
NAKAMURA, T.
The hydration and dehydration phenomena in mitosis IV. The chromonemata as natural existence.
Cytologia, Tokyo 1941 : **12** : 14–20 [from Jap. J. Bot. 1942 : **12** : Abst. 49].

Coiled threads in the spiral stage of mitosis in living staminal hairs of *Tradescantia* were identified with the nuclear threads in the resting stage. On the basis of these and other results it is contended that the chromonemata are a "natural structure."

62. SINKE, N.
The hydration and dehydration phenomena in mitosis. III. Apparent changes in structure of the nucleus.
Cytologia, Tokyo 1941 : **12** : 1–13. [from Jap. J. Bot. 1942 : **12** : Abst. 89].

The fine structure of living nuclei in *Tradescantia* is transformed into a coarse structure by dehydration with hypertonic solutions, and the opposite change is brought about by treatment with water. Similar changes in visible structure are observed when the cells are exposed to high temperatures and then brought to room temperature. In the guard cells of stomata the nuclei show a fine structure when the stomata are in a somewhat closed state and a coarse structure when they are moderately or widely open. In all these cases the chromonemata generally present the spiral configuration when the nuclei are of fine structure and the twisted configuration when they are of coarse structure. The extremely coarse structure of the erythrocyte nucleus of *Triturus pyrrhogaster* can similarly be changed into a fine structure by treatment with hypotonic solutions. It is concluded that the diversity in visible structure in living nuclei is merely superficial and due to the difference in the configuration of the chromonemata which depends mainly on the degree of hydration or dehydration of the nuclei or chromosomes.

63. PFEIFFER, H. H.
Experiments with chromosomes isolated from intermitotic nuclei.
Experientia, Basel 1950 : **6** : 334–35.

Microdissection of chromatin threads in tissue culture and examination of them between crossed nicols has provided evidence regarding their morphology, chemical composition and behaviour in polarized light. On the basis of these observations the writer inclines to the view that the threads are true chromosomes.

64. SATÔ, D.
Karyotype alteration and phylogeny V. New types of Sat-chromosome in *Nothoscordum* and *Nerium*.
Cytologia, Tokyo 1942 : **12** : 170–78. [from Jap. J. Bot. 1943 : **12** : Abst. 208].

Observations on satellite chromosomes in *Scilla, Disporopsis, Nerine, Lycoris, Nothoscordum* and *Nerium* are reported. In some plants nucleoli are organized at the primary constriction.

65. BAKER, J. R. and
CALLAN, H. G.
"Heterochromatin."
Nature, Lond. 1950 : **166** : 227–28.

Use of the term heterochromatin is criticized on the grounds that the ending -in is suggestive of a single chemical substance or group of closely related substances; and that the word heterochromatin refers to a region of a chromosome or to a whole chromosome, not to any particular substance. The word chromatin can also be criticized on almost the same grounds.

66. ÖSTERGREN, G.
Isopycnosis and isopycnotic, two new terms for use in chromosome studies.
Hereditas, Lund 1950 : **36** : 511–13. (Abst.).

The usage of the term heteropycnosis is discussed, and the term isopycnosis is suggested for the opposite effect to heteropycnosis, i.e. the condition in which a chromosome region does not differ in appearance from the majority of the chromosome regions of the cell. It is mentioned that the kinetochore region in many kinds of material is isopycnotic at the first division of meiosis and that this is probably of great importance in explaining the different chromosome behaviour in meiosis when the kinetochore region is negatively heteropycnotic.

67. SUGIURA, T.
A list of chromosome numbers in angiospermous plants. VIII.
Proc. Imp. Acad. Japan 1940 : **18** : p. 30. [from Jap. J. Bot. 1943 : **12** : Abst. 215].

The *n* chromosome numbers of 36 plants belonging to 12 families have been recorded.

68. Matsuura, H.
Chromosome studies on *Trillium kamtschaticum* Pall. XIII. The structure and behaviour of the kinetochore.
Cytologia, Tokyo 1941 : **11** : 369–79 [from Jap. J. Bot. 1941 : **11** : Abst. 470].

The author considers the kinetochore to consist of the chromonema thread, called the kinetonema, which is persistent throughout division, and of the matrix surrounding it which develops fully at metaphase. The behaviour of the kinetochore during division is similar to that of the rest of the chromonema in the pairing, opening out and separation of the daughter halves and in the development of the matrix except that each process is retarded.

69. Battaglia, E.
Effetti citologici del desossiribonucleinato sodico, dell'acido ribonucleinico e ribonucleinato sodico. (**Cytological effects of sodium desoxyribonucleate, ribonucleic acid and sodium ribonucleate**).
Caryologia, Pisa 1950 : **2** : 325–38.

The effects of solutions of the above substances at various concentrations on onion roots were investigated. All three substances induced c-tumours, but c-mitotic effects were only produced by higher concentrations (2–8%) of the two sodium salts. These results are considered in the light of the recent views put forward by Huskins and Kodani on somatic meiosis (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts. 1593–4).

70. Aisima, T.
Studies of mitosis and meiosis in comparison. II. Chromosome structure in the spiral stage and anaphase in mitosis as revealed by means of a maceration method.
Cytologia, Tokyo 1941 : **11** : 429–35 [from Jap. J. Bot. 1941 : **11** : Abst. 431].

Study of chromosome structure in root tips of *Tradescantia reflexa* showed that each anaphase chromosome is composed of two chromatids, each of which contains a chromonema spiral or spirals. The two chromatids may twist round each other. During telophase and interphase the chromonemata remain coiled rather irregularly. At the beginning of prophase the chromonemata within each chromosome seem to draw close together. Then the chromosome spirals are converted into regularly coiled major spirals in which the new minor coiling is in progress, as a result of which the chromosomes shorten and thicken. Gradually each chromosome develops a visible longitudinal split.

71. Kuwada, Y. and
Nakamura, T.
Studies of mitosis and meiosis in comparison. V. Some experimental observations of mitosis in *Tradescantia* staminate hairs.
Cytologia, Tokyo 1941 : **12** : 21–43 [from Jap. J. Bot. 1942 : **12** : Abst. 48].

Mitotic prophase is divided into the following stages: preparatory stage, contraction stage, spiral stage, despiralization stage, post-despiralization stage and final prophase stage. In living staminal hairs of *T. reflexa* mitosis can be stopped at any of these stages, and the nucleus assumes a diffuse structure like a resting nucleus. Moreover, at the post-despiralization stage, the nucleus can take on the diffuse structure temporarily after which

mitosis is completed. The origin of the interkinetic nucleus in meiosis is considered and a comparison is attempted between the stages of meiosis and those of mitosis.

72. KUWADA, Y.
Studies on mitosis and meiosis in comparison. VI. The meiosis, its relation to mitosis.
Cytologia, Tokyo 1942 : **12** : 219–45 [from Jap. J. Bot. 1943 : **12** : Abst. 162].

The different kinds of cell division are discussed. The author believes that anaphase chromosomes each consist of two chromonemata, and the chromonemata division therefore occurs in the nuclear division preceding that in which polar separation of the divided chromonemata or chromosomes takes place. Meiosis is considered to be fundamentally an altered mitosis.

73. BRAUER, I.
Experimentelle Untersuchungen über die Wirkung von Meterwellen verschiedener Feldstärke auf das Teilungswachstum der Pflanzen. (**Experimental investigations on the effect of metre length waves of different field strength upon growth by cell division in plants**).
Chromosoma, Wien 1950 : **3** : 483–509.

As a contribution to observations on the biological effects of irradiation, experiments were carried out on the influence of electromagnetic waves of the order of $\lambda = 1{\cdot}5$ m, with field strengths of 0·1, 0·6, 1, 18, 20, 60, 600 and 1200 m Vm, upon growth and cell division in root tips of *Vicia Jaba*. Field strengths of 600 and 1200 m Vm had an inhibitory effect on the frequency of division, while the lower field strengths increased it. Both field strength and duration of irradiation act together through a highly complex system of processes upon the number of mitoses and the rate of sequence of the mitotic phases.

74. BATTACHARYA, P.
Behaviour of the ring-chromosome in *Drosophila melanogaster*.
Proc. Roy. Soc. Edinb. 1949–50 : **64** : Sect. B. 199–213.

The origin of ring chromosomes is discussed and an account is given of experiments with *Drosophila* from which it is concluded: (1) that in this organism the chromosomes have such axial rigidity that ring chromosomes do not form interlocking chromatids at mitosis; (2) that dicentric ring chromosomes formed at meiosis, on being pulled apart, do not become broken with subsequent reunion of broken ends; (3) there are probably one or more genes in the X chromsome which ensure the orderly segregation of the chromatids in the early cleavage stages of the fertilized eggs; and (4) that inviable zygotes and patroclinous males arise from eggs lacking a monocentric X chromosome, fertilized by Y bearing and X bearing sperms respectively.

75. COLEMAN, L. C.
Nuclear conditions in normal stem tissue of *Vicia Faba*.
Canad. J. Res. 1950 : **28** : Sect. C : 382–91.

It is stressed that before any conclusion can be reached concerning the presence of polyploidy as a characteristic of plant tumours it is first necessary to consider the cytological condition of normal tissue. Accordingly, a cytological study of the normal stem cortex and pith of *V. Faba* was carried out, mitoses being induced by treatment with indole-3-acetic acid. A considerable degree of polyploidy in both tissues was observed and it is considered that this existed in the resting nuclei before treatment with the indole-3-acetic acid. In both the cortex and pith the percentage of polyploid mitoses increased

from the nodal to the middle of the internodal region. Both tetraploid and octoploid nuclei were found, the latter being less than 10% of the total number of polyploid nuclei; in both cases there was usually close association of homologous chromosomes at prophase and metaphase, suggesting that in the case of the octoploid cells two successive divisions of the chromosomes had occurred during the resting phase following the last previous mitosis. In the cortex, however, a considerable number of tetraploid and octoploid nuclei did not exhibit a close association of homologues; in these cases differentiation of polyploid cells must have taken place at least three cell generations before the final differentiation of permanent tissue. Pairing was at times accompanied by the formation of true chiasmata. It is considered that any attempt to determine the extent of polyploidy in normal stems of *V. Faba*, and the relation of polyploidy to tumour development, must be based upon observations of mitoses, since no identification of resting polyploid cells in differentiated tissues is possible.

76. FINK, H.
Experimentelle Untersuchungen über die Wirkung des Nährsalzmangels auf die Mitose der Wurzelspitzen von *Vicia Faba*. (**Experimental investigations on the effect of deficiency of nutrient salts on mitosis of root tips of *V. Faba*).**
Chromosoma, Wien 1950 : **3** : 510–66.

Deficiency in various nutrient salts is shown to lead to disturbances in the nucleic acid metabolism of root tip cells in *V. Faba*, with resultant changes in the staining reaction, accompanied by shortening of the chromosomes, in which euchromatic and heterochromatic portions are indistinguishable, whereas with hypochromasy, despiralization and lengthening of the chromosomes are among the concomitant changes.
The frequency of mitosis and, in many cases, also of various stages of division appears to be associated with the metabolic disturbance in question, but no such association is discernible as regards the mitotic anomalies, i.e. the pathological forms cannot be grouped as characteristic of hyperchromasy or hypochromasy.
The role of nutrient deficiencies and of the excess substitute ions is mentioned with reference to deleterious effects on root growth and mutation.

77. RUCH, F.
Über den Schraubenbau der meiotischen Chromosomen. (**On the spiral structure of the meiotic chromosomes**).
Chromosoma, Wien 1950 : **3** : 357–98.

Having critically discussed the work of previous investigators and their techniques, the author gives an account, illustrated by numerous photographic plates, of his experiments on chromosome structure in *Tradescantia virginica*. From extensive examinations of PMC preparations and of living material under the phase-contrast microscope the writer was unable to discover the double spiral structure claimed for meiotic, metaphase and anaphase chromosomes. He did, however, observe chromatids with chromomeres which formed a single large spiral, and this phenomenon may, he believes, have given rise to the double spiral theory.
A bibliography three pages long is appended.

78. HIRAOKA, T.
Studies of mitosis and meiosis in comparison. III. Behaviour of chromonemata in the pre-leptotene stage in meiosis.
Cytologia, Tokyo 1941 : **11** : 473–82 [from Jap. J. Bot. 1942 : **12** : Abst. 17].

Chromosomes in the pollen mother cells in *Psilotum*, *Tradescantia*, *Trillium*, *Fritillaria* and *Vicia*, which are in different states in the resting phase, become condensed, prior to

leptotene, and form chromosomal bodies in which coiled chromonemata are more or less clearly observable. Chromosome unravelling follows, and leptotene is reached. This contracting and unravelling process is comparable to the spiral stage in mitosis and the stage which directly follows it or the stage in which the spirals are drawn out. From this parallelism the author concludes that the behaviour of chromosomes is fundamentally the same in the beginning in both mitosis and meiosis.

79. HIRAOKA, T.
Studies of mitosis and meiosis in comparison. IV. A contribution to the study of the origin of the "bouquet" and its formation.
Cytologia, Tokyo 1941 : **11** : 483–92 [from Jap. J. Bot. 1942 : **12** : Abst. 18].

Chromosome behaviour at amphitene is described. In pollen mother cells of *Tradescantia* and *Psilotum* the chromosomes are arranged in a whorl or bouquet, and in *Trillium* a peculiar arrangement in asters is observed. On the assumption that no rotation of the nucleus occurs before amphitene, it is concluded that the base of the bouquet corresponds to the distal regions of the chromosomes. Conditions which might give rise to the formation of these bouquet figures are considered.

80. MATSUURA, H.
Chromosome studies on *Trillium kamtschaticum* Pall. and its allies. XXII. Critical evidence of the spiral theory of crossing-over.
Chromosoma, Wien 1950 : **3** : 431–39.

Evidence is presented for the regular breakage of chromatids at first metaphase. It is inferred that these breaks originate from the changing of the relational spiral to a parallel system, owing to the longitudinal cleavage of the matrix, and give rise by reunion of the ends to crossing-over.

81. MATSUURA, H.
Chromosome studies on *Trillium kamtschaticum* Pall. and its allies. XVIII. The rôle of the kinetochore in trivalent formation.
Chromosoma, Wien 1950 : **3** : 418–30.

Observations are reported on trivalent formation in *T. Hagae* which is regarded as a natural hybrid of allotriploid origin between *T. Tschonoskii* and *T. kamtschaticum*. Simultaneous pairing of parts of three homologous chromosomes was possible though it occurred rather rarely. Three kinds of trivalents were distinguishable at first metaphase: a type in which the three kinetochores are associated; a type in which two of the three kinetochores are associated, the third chromosome being conjugated by means of chiasmata; and a type in which the three chromosomes are held together by means of chiasmata only. Several special configurations regarded as important in connexion with the origin of chiasmata are described and are interpreted on the basis of a new concept of the two-plane theory.

82. SAX, K.
The cytological effects of low-intensity radiation.
Science 1950 : **112** : 332–33.

In experiments on *Tradescantia paludosa* continuous exposure to low intensities of γ rays for several months did not seriously reduce pollen fertility or seed set. No cumulative

effect in the production of microspore chromosome aberrations and pollen fertility was observed; after a few weeks' exposure both chromosome aberrations and pollen sterility showed no further increase. The lack of cumulative effect and recovery of normal microspore chromosomes and pollen fertility after the plants were removed from the radiation field indicate that cells containing aberrations did not continue to divide or were outgrown by the normal cells.

83. Conger, A. D. and
Giles, N. H. (Jun.).
The cytogenetic effect of slow neutrons.
Genetics 1950 : **35** : 397–419.

A summary of a report of these investigations has already appeared (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2088).

84. Gustafsson, Å.,
Ehrenberg, L. and
Brunnberg, M.
The effects of electrons, positrons and α-particles in plant development.
Hereditas, Lund 1950 : **36** : 419–44.

The distribution within the plant and cytological effects of the radioactive isotopes P^{32}, S^{35}, Rn^{222}, Na^{22} and Po^{210} absorbed by the barley variety Bonus from solutions of the isotopes are described. P^{32} gives rise to more surviving plants than X-irradiation, but these are more sterile. In the case of S^{35}, spike fertility is less disturbed than with P^{32} Rn^{222} resembles fast neutrons in its effect; it induces marked sterility but many plants survive. Na^{22} is less effective in bringing about chromosome fragmentation than P^{32} and S^{35}; it produces root tumours.
All the isotopes readily bring about chromosome fragmentation and inhibit meiosis. Rn^{222} gives rise to three to four times as many 2-centromere formations as P^{32}, S^{35} or Na^{22}.

85. Darlington, C. D. and
La Cour, L. F.
Hybridity selection in *Campanula*.
Heredity 1950 : **4** : 217–43.

La Cour, L. F.
Appendix : Compound constrictions.
Ibid. 1950 : **4** : 243–48.

Experiments were carried out on ring formation and the origin of interchanges, monosomics, telocentrics and isochromosomes in *C. persicifolia* with a view to elucidating the breeding system. Incipient complex heterozygotes with ring formations were produced artificially by hybridization. They showed different degrees of true breeding in regard to ring formation according to the degree of inbreeding. The greater the degree of inbreeding the greater the selection for hybridity as shown by the structural hybridity. Vigour and fertility were reduced with increasing size of ring. The cytological irregularity and infertility associated with large rings produced experimentally in *Campanula* may be contrasted with the fertility associated with the large natural rings of *Oenothera*, *Rhoeo* and *Hypericum*. Large rings are not genetically advantageous enough for survival in an outbreeding species. Their development is favoured by a transition to inbreeding such as is assumed to have occurred in *Oenothera*.
Study of telocentrics in Russian stocks showed that they arise in *C. persicifolia* by misdivision of the centromere following failure of pairing at meiosis as in other plants. The

origin of new telocentrics is considered to be an important means of increasing the basic number of chromosomes, and thus altering the number of linkage groups and even the balance of the nucleus. On the other hand the occurrence of a monosomic plant deficient for a new interchanged chromosome revealed how the basic number of chromosomes can be reduced. Instability of chromosome number possesses both the advantages and disadvantages of setting up genetic isolation of old and new forms. Like the interchanges, the telocentrics show the constant action of selection favouring the equilibrium of hybridity established as normal for the breeding system of the stock concerned.
The appendix gives an account of a chromosome pair in *C. persicifolia*, one member of which shows attachment between the nucleolus and centromere and wide centric constriction during mitosis. Other cases of such association and of centric constrictions reported in the literature are examined.

86. D'Amato, F.
Sull'attivatà mutagena dell'acenaftene. (**The mutagenic activity of acenaphthene**).
Nuovo G. Bot. Ital. 1948 : **55** : 323–24.

Tests were made of the effect of solutions of acenaphthene at different concentrations. Solutions in distilled water were too toxic but saturated and half-saturated solutions in tap water caused frequent chromosome fragmentations. The effect may be exerted either before or after the chromatids divide, leading to chromosome or chromatid fragments respectively. Fusion of chromatid fragments may give rise to dicentric fragments. Breakage of the centromere was also occasionally observed. Acenaphthene is the only chemical so far known which acts both as a mutagenic and a polyploidizing agent.

87. D'Amato, F. and
Avanzi, M. G.
Primo contributo alla conoscenza dell'attività citologica e fisiologica delle sostanze di crescita sul testo *Allium Cepa*. (**A first contribution to the knowledge of the cytological and physiological activity of growth substances in the *Allium Cepa* test**).
Caryologia 1949 : **2** : 31–54.

D'Amato, F.
Prime osservazioni sulla inibizione pre-profasica della cariocinesi nei meristemi radicali. (**Preliminary observations on the pre-prophase inhibition of caryocinesis in root meristems**).
R.C. Accad. Lincei. Sed. Solenni 1948 : **5** : 460–65.

Experiments on the effect of a number of substances on onion root tips have led to the conclusion that the action of those substances which exert a pre-prophase inhibitory effect is quite different from that of substances such as colchicine which inhibit spindle action. The action of the first group is very similar to that of physical agencies such as irradiation which inhibit the initiation of mitosis. Many growth substances, when applied in high doses, act in this way, whereas in low doses they act as mitotic stimulants. The threshold values of the respective concentrations are different for the different compounds and for the organism to which they are applied. At certain concentrations the growth substances exert c-mitotic effects too.

88. D'Amato, F.
Notes on the chromosome breaks induced by pure Gammexane.
Caryologia, Pisa 1950 : **2** : 361–64.

Chromosome fragmentation in onion roots was readily brought about by treatment with a saturated solution of γ-hexachlorocyclohexane, especially if the roots were transferred afterwards to tap water.

89. MATSUURA, H.
Chromosome studies on *Trillium kamtschaticum* Pall. Alterations of the nucleolus-chromosome system due to irradiation.
Cytologia, Tokyo 1942 : **12** : 271–88 [from Jap. J. Bot. 1943 : **12** : Abst. 169].

Pollen grains from X-irradiated pollen mother cells showed (1) disturbance of the usual relationship between chromosomes and nucleoli which was often so profound that every chromosome end might become functional as a nucleolar organizer and (2) translocations and inversions involving terminal segments, the nucleolus organizing regions taking intercalary positions and thus giving rise to SAT constrictions.

90. WEXELSEN, H.
Polyploidiforedling. En oversikt. (**Polyploid breeding. A review**).
Forskning, Forsk. Landbruk, Oslo 1950 : **1** : 287–310.

The following aspects of the subject are discussed: autopolyploidy and the origin of polyploid forms; artificial induction of polyploidy and its effects on morphological and physiological characteristics, e.g. plant and cell size, drought resistance, earliness, fertility, hardiness and the chemical composition of the plant, including dry matter content; the genetic consequences of polyploidy and the breeding of polyploid forms of various crops; allopolyploidy and its genetical basis; and the value of artificially produced allopolyploids in plant breeding.

91. DOLCHER, T.
Sulla costituzione cariologica dei tessuti differenziati delle Leguminose.
(**On the caryological constitution of differentiated tissues in the Leguminosae**).
Caryologia, Pisa 1950 : **2** : 339–60.

Cell division in differentiated tissues of *Lathyrus odoratus* and *Lens esculenta* was induced by treatment with 2,4-dichlorophenoxyacetic acid. In the former species, the nuclei of the pith were found to be diploid, but tetraploid and octoploid nuclei were discovered in the cortex. In *Lens*, the state of affairs was similar with polyploid cells in the epidermis too. A general discussion on polysomaty follows.

92. LINNERT, G.
Untersuchungen über die Cytologie polyploider Pflanzen. II. (**Investigations in the cytology of polyploid plants. II**).
Chromosoma, Wien 1950 : **3** : 399–417.

As part of a general investigation of the regulatory mechanism in chromosome pairing during the gradual transition from quadrivalent to bivalent pairing, meiosis was first studied in artificially produced tetraploids (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1607). The present paper presents as a complementary study a description of meiosis in an old, natural polyploid, *Digitalis*, as represented by *D. ambigua*, *D. lutea* and *D. purpurea*. The basic number for the genus is 7. *D. purpurea* carries an octovalent and is therefore held to be octoploid. *D. ambigua* is also regarded as octoploid, while *D. lutea* appears to be 16-ploid.
An estimate of the percentage of open end associations among the bivalents (excluding nucleolar chromosomes and quadrivalents) showed a high incidence, but without univalent formation. Interference due to chiasmata may explain this.
As regards the main problem of the regulatory mechanism in pairing, the following findings are regarded as suggestive: (1) the increased tendency of the heterochromatin to pairing,

which should promote multivalent formation; and (2) the marked chiasma interference (previously postulated) with the high percentage of open end associations; this should promote bivalent association.

93. Salvatore, C. A.
Action of estrone and progesterone on nuclear volume (studied by applying the karyometric-statistical method).
Biol. Bull. Wood's Hole 1950 : **99** : 112–19.

Estrone induces interphasic nuclear growth leading to doubling of the nuclear volume in certain uterine cells of castrated female rats. It appears that the increase in volume is due to doubling of the chromosome number.

94. Östergren, G.
Cytological standards for the quantitative estimation of spindle disturbances.
Hereditas, Lund 1950 : **36** : 371–82.

A general discussion is presented of the different types of spindle disturbance that may be induced by chemical substances. It is recommended that the degree of disturbance should be estimated from the relative frequency of cells showing abnormal chromosome distribution at telophase.

95. Mrkos, H.
Über Erfahrungen bei der Herstellung von Tetraploiden mit Hilfe von Colchicin und Schnellmethoden zur Untersuchung der Chromosomenanzahl. (**Research on the production of tetraploids by means of colchicine and rapid methods of investigating the chromosome number**).
Bodenkultur, Wien 1950 : **4** : 138–41.

This paper deals with some of the more recent findings of the Swedish research institutes at Weibullsholm, Svalöf and Alnarp, on induced tetraploidy, with special emphasis on techniques.

96. Frahm-Leliveld, J. A.
Experiments with polyploidogenic and other agents in different types of plants under tropical conditions.
Ann. R. Bot. Gdns Buitenzorg 1949 : **51** : 231–67.

Distinction is drawn between the following types of deviation from normal nuclear division caused by treatment with chemical substances: (1) inhibition of mitosis produced by a chemical which acts purely as a toxic drug, phenomena such as tropokinesis, mesostathmokinesis and stathmokinesis occurring; (2) nuclear abnormalities observed during the application of a chemical agent which exerts a general toxic effect; and (3) c-mitosis proper due to a polyploidizing agent.
Experiments were carried out at the Malang Station, Java, during the period 1939–43 on the effect of various colchicine treatments on coffee. No permanent polyploidy was obtained by application of colchicine in lanolin paste to the leaf buds or other methods; treatment with acenaphthene and other agents was also unsuccessful.

Experiments on the chemical induction of polyploidy were resumed in 1946 at the Treub Laboratory of the Royal Botanic Gardens, Buitenzorg, using mainly *Canavallia* seedlings and onion roots. The substances tested included vapours of *p*-dichlorobenzene and of several other substances. With the exception of aqueous colchicine solution, no agent was successful in inducing polyploidy. Mixtures of colchicine with other substances were also tested, using *Canavallia* seeds and onion roots; in a few cases slight stimulation of c-mitotic action could be observed but in general combinations of drugs did not appear to possess any practical value on account of the mitotic inhibition and toxic effect often produced.
The effect of the addition of wetting agents and similar industrial compounds upon the action of polyploidizing substances was investigated. The majority of the agents appeared to exert a toxic effect. The best results were obtained with Dispersol VL from ICI. Addition of a very small quantity of this preparation caused colchicine to be active at a much lower concentration and over a much wider area of tissue in a given period with no or very little toxic effect.
The view is expressed that all polyploidizing agents have an essentially identical chemical activity; the physico-chemical properties may however vary according to the lipoid solubility of the agents. Colchicine is still considered to be the most satisfactory substance for polyploid production.

97. Straub, J.
Die Beseitigung der Selbststerilität durch Polyploidisierung. (**The elimination of self sterility by polyploidization**).
Ber. dtsch. Bot. Ges. 1941 : **59** : 296–304.

Wild diploid, self sterile races of *Antirrhinum glutinosum* and *A. molle* become highly self fertile when tetraploidy is induced. In view of the technique used in the colchicine treatment, in the author's experiment it was clear that the self fertility was a result of genome reduplication. The self fertility may, it is thought, be due to dilution of the inhibitory substances in the tetraploid carpels or to some alteration in the mode of reaction between pollen tube and ovarian tissue, as a consequence of some change affecting the component of the allelomorphs of the group of factors conditioning sterility.
Evolutionary and physiological implications of this suggestion are shortly examined.

MICROSCOPIC TECHNIQUE

98. Azcoaga, J. E.
Substituto de la celoidina para inclusiones histológicas. (**A substitute for celloidin for histological embedding**).
Ciencia e Investigación, B. Aires 1950 : **6** : 381–82.

The material suggested is photographic and recording film, which is emulsified in water at 70–80° C., dissolved in acetone and precipitated out with 96% alcohol.

99. Horn, K.
Borremarg som erstatning for hyllemarg. (**Burdock pith as a substitute for elder pith**).
Blyttia, Oslo 1950 : **8** : 75–76.

This illustrated note points out the usefulness of burdock pith in sectioning. It is tougher than elder pith and soft enough to be used for embedding purposes.

100. Babcock, E. B. and
Hughes, M. B.
A new type of self-sterility in plants.
Proc. Nat. Acad. Sci. Wash. 1950 : **36** : 363–64.

Hughes, M. B. and
Babcock, E. B.
Self-incompatibility in *Crepis foetida* (L.) subsp. *rhoeadifolia* (Bieb.) Schinz et Keller.
Genetics 1950 : **35** : 570–88.

An account is given of a study of incompatibility groups in the progeny of a cross between two self incompatible plants of *C. foetida* subsp. *rhoeadifolia*. The data can be explained on the assumption that self and cross incompatibility depend on a single series of oppositional alleles, designated S_1, S_2, S_3 and S_4. It is postulated that: (1) pollen behaviour depends on the genotype of its parental sporophyte rather than on its own genotype; (2) S_1 is recessive to the other three alleles, S_2 is dominant to S_1 but recessive to S_3 and S_4, and S_3 and S_4 are both dominant to S_1 and S_2 but each is capable of complete expression in the presence of the other; and (3) reciprocal differences are due to dominance and not to homozygosity of one parent. Other genes are thought to have modifying effects, especially in association with S_1 and S_2.
This type of self sterility, which is similar to that found by Gerstel in *Parthenium argentatum* (cf. Abst. 551) is compared with other known types.

101. Beams, H. W. and
King, R. L.
Pollen germination in relation to group size.
Proc. Iowa Acad. Sci. 1947 : **54** : 127–29.

Pollen grain germination of *Vinca rosea* on agar is at its optimum when 8–10 grains are grouped together, and decreases with reduction in the number of grains lying adjacent.

102. Golubinskiĭ, I. N.
(On the effect of the antibiotic substances of the onion upon germination of pollen grains).
Priroda (Nature) 1949 : No. **3** : 67–68.

It was found that the pollen grains of fifteen different species of plants ceased growing in Petri dishes when circular slices of freshly cut onion were placed at the bottom of the dishes. Exposure of the pollen grains to an atmosphere containing the volatile exhalations of the onion for five minutes was sufficient to kill the grains. Slices of onion cut thirty minutes before the treatment did not kill the grains. The effect of the onion derivatives was limited to pollen growing in nutrient culture; dry pollen of the fifteen species studied treated for 24 hours with onion exhalations remained viable. Onion juice, even in minute quantities, had a very powerful lethal effect upon growing pollen tubes. Whole small bulbs of onions with the scale leaves left intact did not stop pollen growth but the resulting pollen tubes were thinner that those of the pollen in controls. The presence of bulbs also caused a temporary check to their development. At 20° C. the delay was between 6 and 8 days.

103. Bernström, P.
Cleisto- and chasmogamic seed setting in di- and tetraploid *Lamium amplexicaule*.
Hereditas, Lund 1950 : **36** : 492–506.

Of two lines of *L. amplexicaule*, one was found to set as much seed from the chasmogamic flowers as the cleistogamic flowers, while in the second, the chasmogamic flowers were

* General studies, see also individual crops.

inferior in seed setting capacity. In the tetraploid derivatives of these two forms, the chasmogamic flowers invariably set less seed.

104. TURRILL, W. B.
Modern trends in the classification of plants.
Advanc. Sci. 1950 : **7** : 238–53.

The respective roles of cytology and genetics in plant classification and the relation between phylogeny and taxonomy are among the topics discussed.

AGRICULTURE

105. HAMMING, G.
Het samenvatten van rassenproeven en het toepassen van vruchtbaarheidscorrecties met niet-orthogonale methoden. (**Summarizing variety trials and applying fertility corrections by non-orthogonal methods**).
Versl. Landbouwk. Onderzoek., 's-Gravenhage 1949 : Pp. 197.

This doctorial thesis is divided into four parts: general principles, characteristics of research on varieties, summarizing variety trials, and the calculation of fertility corrections in individual fields.
In the first two sections are developed the ideas required for dealing with the problems presented in the last two sections. Greater attention has been paid to some principles about which there is generally misunderstanding; for example, the idea that the yield of a certain variety in a given experiment can be considered to be the sum of one contribution from variety and one from the experimental field.
In his introduction the author states that the simplest problem was that of fertility corrections. Trials of fodder crops may comprise over 100 varieties and, as each trial is 1 to 2 hectares in area, irregularity is unavoidable and differences of 30% in fertility occur. Fertility is not orthogonal, so Fisher's methods are inapplicable, and the graphic methods, associated in Holland with the name of Visser, are more useful.
The more difficult problem is the summarizing of variety trials, with changing numbers of varieties, which cannot be "Fisherized." A method of calculating variety means, giving results equal to those obtained by van Uven's method, which cannot be applied here because of the large number of unknowns, was found to be unreliable because of the occurrence of correlations resulting from similar reactions to environment by several varieties. The work done on this problem should provide a useful foundation for studying the theory of errors involved.

106. ÅKERMAN, Å.
Bedömning av stråsädessorters odlingsvärde med ledning av jämförande försök. (**Determining the value of cereal varieties for cultivation with guidance from comparative trials**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 277–84.

The lecturer gave a review of the methods used in Sweden in conducting variety trials, with various recommendations as to how the system might be improved in some respects.

107. BHAT, N. R.
Crop weather studies as an aid to the breeding and introduction of crop plants.
Poona Agric. Coll. Mag. 1950 : **41** : 45–49.

A general discussion is given of the utilization of data on the relationships between crops and weather as an aid to introduction and breeding. Attention is drawn to the importance

of establishing agroclimatic analogues or homoclimes throughout the world; by application of knowledge on homoclimes it may be found possible to grow immediately in the less agriculturally advanced regions superior varieties developed in the economically advanced countries.

108. NUTTONSON, M. Y.
Ecological crop geography of Finland and its agro-climatic analogues in North America.
Amer. Inst. Crop. Ecol. Wash. 1950 : Study No. 10 : Pp. 35.

NUTTONSON, M. Y.
Agricultural climatology of Sweden and its agro-climatic analogues in North America.
Ibid. 1950 : Study No. 11 : Pp. 27.

NUTTONSON, M. Y.
Ecological crop geography of Norway and its agro-climatic analogues in North America.
Ibid. 1950 : Study No. 12 : Pp. 31.

Three further studies are added to this series on agro-climatic conditions in various countries and their American counterparts (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 119).

109. NUTTONSON, M. Y.
Agricultural climatology of Siberia, natural belts, and agro-climatic analogues in North America.
Amer. Inst. Crop. Ecol. Wash. 1950 : Study No. 13 : Pp. 64.

A further study is added to this series on agro-climatic conditions in various countries and their North American counterparts (cf. Abst. 108).

110. TOKIN, B. P.
(Searching for new antibiotics).
Priroda (Nature) 1949 : No. 6 : 21–31.

A collection of plants having antibiotic properties, at the (Tomsk?) institute where the present writer is conducting his research, is mentioned. There are 300 species of plants, belonging to more than 50 families, in the collection. The antibiotic action of 70 of these plants upon protista is as strong as that of onions and garlic.

111. COGNETTI DE MARTIIS, S.
Per il miglioramento delle piante erbacee a delle sementi. **(For the improvement of herbaceous plants and seeds).**
Agricoltura Venezie 1950 : **4** : 158–61.

The provincial authorities of Vicenza have established an institute of agricultural technology (Istituto di Tecnica Agraria Nazzareno Strampelli) in Lonigo, one of the objects of which is to encourage the production of high quality seeds of agricultural plants and vegetables, for which the north of Italy is so naturally suited.

112. Perkins, D. D. and
Ryan, F. J.
La mutación en los microorganismos. (**Mutation in microorganisms**).
Ciencia e Investigación, B. Aires 1950 : **6** : 387–96.

A review is given in Spanish of the recent work on mutation in microorganisms, which shows the random, non-adaptive nature of the mutations in all but a very few, still somewhat doubtful, cases. The studies of biochemical mutants and their inheritance have shed light equally on the processes of genetics and of biochemical synthesis; and those of the bacteria and bacteriophages have contributed to the knowledge of the sexual processes in these organisms. The results indicate that the mutation process in the microorganisms is no different from that in other species.

113. Imšeneckiĭ, A. A.
(**Breeding microorganisms**).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 6 : 45–54.

Training fungi and bacteria under different external conditions and a Mičurinite method of selection, based upon frequently occurring morphological changes in new physiological races, are advocated.

114. Jackson, S. and
Hinshelwood, C.
An investigation of the nature of certain adaptive changes in bacteria.
Proc. Roy. Soc. 1950 : **136** : Ser. B : 562–76.

Four strains of bacteria which, until trained, show a long lag before utilizing certain new sources of carbon or nitrogen, have been examined by methods involving the transfer of inocula at widely varying dilutions to liquid or solid media containing the new substrate. It was found that all cells were ultimately able to develop in a new substrate provided they survived the lag phase. No evidence of selection of special cells was obtained. In one experiment very wide fluctuations occurred among identical inocula as soon as the conditions of survival became different; these fluctuations are regarded as statistical rather than inherited.
Two major hypotheses are possible for the interpretation of such adaptive changes in bacteria. According to one hypothesis, chance mutants are produced which are capable of growing satisfactorily in the new medium; the long lag period represents the time required for a minute proportion of the population to multiply up to a size of the same order as the total original number. According to the second hypothesis, the long lag represents the time during which the intermediate substances necessary for growth are being elaborated by the cells by an unaccustomed process, the enzymatic mechanisms being initially inadequate for this purpose. The view is expressed that the two theories are not necessarily opposed. The first postulates the selection of a few cells favoured by chance; the second involves the relative increase in certain parts of the internal structure of all cells, i.e. a sort of internal selection. It is pointed out that certain changes of pattern in the cell material, produced originally by an unusual combination of circumstances, can very well be passed on to the progeny by the ordinary copying process of autosynthesis; on the other hand considerations based upon chemical kinetics show that adaptive changes can and must occur, which can affect the progeny in much the same way. The view is expressed that the reasons why acquired characters are not transmitted in multicellular organisms do not apply to unicellular organisms, in which not only the nature of the hereditary process but the very nature of an "acquired character" is different.

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* General studies, see also individual crops.

115. KAPLAN, R. W.
Mutationsforschung an Bakterien. (Ein Überblick). [**Research on mutation in bacteria. (A review)**].
Naturwissenschaften 1950 : **37** : 249–54, 276–84.

A comprehensive survey is given of the results so far obtained from research by the author and other investigators on the problem of mutation in bacteria.

116. KAPLAN, R. W.
Auslösung von Phagenresistenzmutationen bei *Bacterium coli* durch Erythrosin mit und ohne Belichtung. (**Induction of phage-resisting mutations in *B. coli* by erythrosin with and without illumination**).
Naturwissenschaften 1950 : **37** : p. 308.

Earlier reports described the induction of colony mutations in *B. prodigiosum* after staining *intra vitam* with erythrosin, with and without light. Experiments were now made to obtain similar effects in the case of *B. coli*. Results showed an increase in the mutation ratio due to purely toxic action of the stain and also to the photodynamic effect. Incidentally the ratio of resistance mutations appearing immediately and those appearing after delay was 1 : 10 in the case of phage T7 and 1 : 100 in the case of phage T1, a result which might indicate some difference in the delaying mechanism of the two resistance mutations.

117. HAAS, F. L.,
CLARK, J. B.,
WYSS, O. and
STONE, W. S.
Mutations and mutagenic agents in bacteria.
Amer. Nat. 1950 : **84** : 261–74.

Previous experiments have shown that mutation to penicillin or streptomycin resistance can be induced in *Micrococcus aureus* by growing the organism in nutrient broth and certain synthetic media which have been irradiated with ultraviolet light (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1585) or treated with hydrogen peroxide (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 820). In an attempt to characterize the mutating principle and to determine the method of its production by ultraviolet irradiation or hydrogen peroxide treatment, some physical aspects of treatment of the substrate and of the treated substrate itself have now been investigated in experiments on *M. aureus* and *Escherichia coli*.
It was found that the mutating principle could not be removed from irradiated media by charcoal but that successive inoculations with bacteria removed it completely. In irradiation of the substrate the most effective wave lengths fell within the range of 2000 Å or below. The temperature of the substrate during irradiation also affected mutation frequency. The mutagenic substances produced in the medium by ultraviolet irradiation possessed a maximum point beyond which further irradiation produced no more mutagens but in fact appeared to destroy those already produced.
Both phage resistant and susceptible colonies of *E. coli* were tested for biochemical mutations. A proportion of the phage resistant colonies were found to have biochemical deficiencies but no biochemical mutants were detected among the phage susceptible colonies. The more complete the medium the lower was the incidence of mutation to bacteriophage resistance.
Visible light reversed the lethal effect of ultraviolet irradiation in *M. aureus*. Irradiation of the medium with infrared rays reduced the incidence of spontaneous mutations and caused severe killing of bacteria subsequently inoculated into the medium. Irradiation with ultraviolet followed by infrared rays resulted in severe killing and a decrease in number of mutants even below the normal frequency.

The possible nature of the chemical mutagens produced by the action of ultraviolet rays is discussed. It is emphasized that the relative importance of indirect genetic effects occurring when the immediate change induced by radiation is outside the chromosome, and the relation of oxygen and hydrogen peroxide and free radicals to mutations and chromosome breakage are unsolved problems of increasing importance.

118. Matsumoto, T.
Phage-produced resistance strains of *Bacillus aroideae*. III. Culture in soils and host plants.
Trans. Nat. Hist. Soc. Formosa 1941 : **31** : 145–54 [from Jap. J. Bot. 1941 : **11** : Abst. 467].

When *B. aroideae* and its bacteriophage are cultured in solution resistant strains arise and the phagic action rapidly disappears. If the culture is made in clay soils, however, the phagic action may continue much longer, but the virus is easily impaired above 25°C. In culture on radish discs the virus maintains itself much longer and accumulates rather abundantly at about 31°C. If, after a certain time, the culture is subjected to 13–19°C, the virus can remain unimpaired considerably longer, even in the case of soil culture.

119. Falck, R.
Lysenko's theory of the variable gene viewed in relation to the life sphere system of fungus taxonomy.
Palest. J. Bot. 1949 : **7** : R. Ser. : 126–34.

Adaptive changes in the phylogenetic development of the sporangia of fungi are considered in relation to the Mičurin-Lysenko theory of inheritance. Certain adaptive changes in the mycelia of some fungi, it is suggested, have occurred simultaneously with and parallel to the adaptive changes in the sporangia. The hypothesis is put forward that each gene and each homologous type of organ possesses the dual properties of relative stability and variability: it is considered that this general conclusion is essentially in agreement with the Mičurin-Lysenko theory of the variable gene.

120. Beneke, E. S. and
Wilson, G. B.
Treatment of *Allomyces javanicus* var. *japonensis* Indoh with colchicine and sodium nucleate.
Mycologia 1950 : **42** : 519–22.

Results are presented which show that sodium nucleate treatment of germinating zygotes increases the frequency of development of gametophytes and sporophytes instead of gametophytes only from resistant sporangia; and it seems likely that colchicine has a similar effect. It is tentatively suggested that (*a*) haploid thalli are inherently gametophytic and diploid or polyploid thalli inherently sporophytic, (*b*) treatment of the germinating zygote induces polyploidy in some nuclei and thus the resulting asexual thalli may be mixoploids, and (*c*) at reduction division during the germination of the resistant sporangia some planonts would be haploid and some diploid or polyploid. The haploid would then be expected to give rise to sexual thalli and the others to asexual thalli.

121. Andes, J. O. and
Keitt, G. W.
Variability of *Glomerella cingulata* (Stonem.) S. & v.S. from apples.
Phytopathology 1950 : **40** : 915–25.

A study was made of the variability of strains of *G. cingulata*. Only chromogenic strains were clearly differentiated morphologically. Segregation of plus and minus types in the

asci was in general similar in all strains, except the chromogenic ones which did not produce perithecia. With one exception, three patterns of segregation were obtained: all plus, all minus, and half plus and half minus. When certain vitamins were added to purified media differential growth responses between strains were recorded, which appeared to be genetically conditioned.

122. BALDACCI, E. and FORLANI, R.
Richerche sulla specializzazione della *Claviceps purpurea*. (**Research on specialization of *C. purpurea*).**
Phytopath. Z. 1950 : **17** : 81–84.

A new race p_5 of *C. purpurea* occurring in Italy is recorded. It differs from Stäger's races p_1 and p_3 and from Mastenbroek and Oort's race p_1 by attacking *Secale* and *Lolium* but not *Bromus*.

123. POMPER, S.
Recent developments in yeast genetics.
US Atom. Energy Com. Oak Ridge National Laboratory 1950 : ORNL-696 : Pp. 21.

Studies by various investigators on the genetics and reproduction of yeasts, the techniques available for making such studies, the problem of genetic markers and the induction of biochemical mutations are reviewed, and possible future developments are discussed.

124. CASTELLI, T.
I lieviti selezionati nella vinificazione. (**Selected yeasts in wine making).**
Ann. Accad. Agric. Torino 1949 : **91** : No. 2 : Pp. 24.

Studies were made of musts from fresh grapes selected in different localities of Italy and cultures made of the yeasts they contained. The fermenting capacity of all cultures was determined and for the majority the quantity of volatile acids formed was also measured. Though in most of the samples *Pseudosaccharomyces apiculatus* and *Saccharomyces ellipsoideus* were the predominant species, a great number of other species were also present, in varying proportions in different localities. These included a sporogenous apiculate species of *Hanseniospora*. Marked differences were noted in fermenting capacity, in volatile acid production and in the optimum temperature for fermentation. The species *Torulospora Rosei*, which occurred in most samples, produces very little volatile acid and for this reason, though its fermenting capacity is not high, it is recommended for use in pure cultures. All the evidence so far available indicates that the best results in fermentation are obtained from yeasts selected from the local populations of the region concerned.

125. CASTELLI, T.
Nella vinificazione con fermenti selezionati è bene attenersi sempre a culture di *Saccharomyces ellipsoideus*? (**Is it right to confine ourselves to *Saccharomyces ellipsoideus* in vinification with selected yeasts?**)
Ann. Microbiol. 1942 : **2** : 1–4.

A study of 19 yeast races, 11 belonging to *Torulospora Rosei* and 8 to *Torulopsis pulcherrima*, isolated from grape musts in central Italy, is reported. Both species produced very small amounts of volatile acids and no acetone; the former species also gives reasonable quantities of alcohol, up to 10%, and is recommended for use in selected yeasts because of its favourable effect on the quality of the product.

126. Sinotô, Y. and
Yuasa, A.
Karyological studies in *Saccharomyces cerevisiae*.
Cytologia, Tokyo 1941 : **11** : 467–72 [from Jap. J. Bot. 1941 : **11** : Abst. 509].

The vegetative nucleus consists of a central, spherical or irregular caryosome surrounded by a hyaline zone and membrane. The caryosome is homogeneous and stains deeply; it is Feulgen positive. Four thick thread like chromosomes appear at mitosis. One daughter nucleus remains in the mother cell and the other passes through the isthmus to the daughter cell, assuming, as it does so, a dumb-bell shape which may have led to the erroneous assumption that amitosis occurs in yeast.

127. Kvasnikov, E. I. and
Hrolikova, V. G.
(**The yeasts used in wine making in central Asia**).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 7 : 31–35.

Over 200 races of yeasts were collected and studied at the Central Asiatic Branch of the Magarač Institute. Descriptions are given of the more promising yeasts selected.

VIR-3

The race was selected from a wine which was fermented with wild yeasts at the Central Asiatic Research Station of VIR*. It can be used for making white wine, red wine and champagne. A strain BM has been cultured and is being tried in the fermentation of champagne.

Rkaciteli-6 [RC-6]

This race was selected from grapes of the variety Rkaciteli growing in the vineyards of the Central Asiatic Branch of the Margarač Institute. It is suitable for fermenting white, red and bottled sparkling wines.

Saperavi 46 [SP-46]

It is recommended for making dry red wines. The race was selected from a Saperavi wine at the Magarač Institute.

128. Palleroni, N. J.
Experiencias sobre cruzamientos de levaduras. (**Experiments on crossing yeasts**).
Rev. Fac. Agron. B. Aires 1950 : **12** : 302–17.

Yeast hybrids were obtained by crossing haploid cultures of selected strains. All the hybrids proved superior in fermentative power to the ancestral types.

129. Wagner, F.
Auftreten, Sporenkeimung und Infektion des Zwergsteinbrandes an Weizen. (**The occurrence of dwarf bunt, germination of its spores and the infection by it of wheat**).
Z. Pflanzenb. Pflanzenschutz. 1950 : **1** : 1–13.

The author considers the results of other workers and his own relating to the differences in the conditions which promote germination of the spores of dwarf bunt and ordinary bunt.

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* Vsesojuznyĭ Institut Rastenievodstva [=U.S.S.R. Institute of Plant Industry].

If the North American races of dwarf bunt prove identical with those found in Germany, the prospects of breeding for resistance in wheat seem favourable.
Spores taken from plants suffering from dwarf bunt differed from all the other collections of bunt spores tested, by showing more marked reticulation. According to the author's suggested nomenclature the pathogen of normal bunt would be *Tilletia triticoides* and the pathogen of dwarf bunt, as judged by the form of the spores, would be identical with *T. Tritici*; but if the prickly spore found in dwarf bunt also occurs in ordinary bunt, as seems likely from the relevant literature, then the pathogen of dwarf bunt must be considered as a special subspecies *T. Tritici* var. *nanifica*, and the pathogen of normal bunt would be named *T. Tritici* var. *Tritici*.

130. Stover, R. H.
The black rootrot disease of tobacco. I. Studies on the causal organism *Thielaviopsis basicola*.
Canad. J. Res. 1950 : **28** : Sect. C : 445–70.

Information on the mutational behaviour of *Th. basicola* is included. Two distinct forms of the fungus exist in nature, designated the brown and grey wild types, differentiated by their cultural characteristics on potato dextrose agar. The brown type occasionally mutates to the grey in artificial culture, soil and host. In a few cases, only in association with host passage, the grey wild type has mutated to the brown. The wild types do not remain stable on media which support abundant saprophytic growth but give rise to and are crowded out or replaced by cultural mutants.

131. McVeigh, I. and
Campbell, F.
The growth of *Trichophyton mentagrophytes* and five of its variants as affected by several nitrogen sources.
Mycologia 1950 : **42** : 451–69.

From nine variants, five of which showed wide differences, were selected for further experiments, and were studied, together with the normal form with respect to their ability to utilize various sources of nitrogen. A relationship was found between the type of growth of the different forms and the changes they caused in the pH of the culture media. The results substantiate the belief that the pleomorphic forms of *T. mentagrophytes* are due to mutations rather than to heterocaryosis and nuclear separation.

132. Owen, J. H.,
Walker, J. C. and
Stahmann, M. A.
Variability in onion neckrot fungi.
Phytopathology 1950 : **40** : 749–68.

According to the observations of the authors and other investigators, *Botrytis Allii* and *B. byssoidea* are closely similar, except for their behaviour as regards sporulation and a relatively small difference in the range of the length and width of the conidia. A study of natural and induced variants in each species was therefore carried out to determine whether or not one of the species arose as a mutation from the other. Although an atypical wild strain of *B. Allii* was extremely variable and variants showing a considerable range were induced in typical *B. Allii* by nitrogen mustard and in *B. byssoidea* by nitrogen mustard and ultraviolet radiation, no indication was obtained that either species is a variant of the other.

133. Atkinson, R. G.
Studies on the parasitism and variation of *Alternaria Raphani*.
Canad. J. Res. 1950 : **28** : Sec. C : 288–317.

The investigations reported included the study of naturally occurring strains of *A. Raphani* and the cultural variants derived from the wild type strains. Both the naturally occurring biotypes and cultural variants showed considerable diversity in virulence of their attack upon radish seed. The spontaneous origin and stability of the cultural variants favour the view that they were mutants.

134. Eisenstark, A. and
Thornberry, H. H.
Plaque formation by *Xanthomonas pruni* bacteriophage.
Phytopathology 1950 : **40** : 876–77.

A procedure for inducing plaque formation is described. Plaques variable in size and surrounded by a halo of variable width appeared in some plates, suggesting the existence of genetic varieties of the phage. When phage from single plaques of the halo type were reinoculated to young cells the resulting plaques were largely of the halo type.

CROP PLANTS

135. Maliani, C.
Relazione su l'attività svolta dalla Stazione Fitotecnica di Badia Polesine nel primo decennio (1937–1947). [**Report on the activities of the Plant Breeding Station of Badia Polesine in the first decade (1937-1947)**].
Genetica Agraria, Roma 1948 : **2** : 107–47.

This report provides a general account of the work at the Badia Polesine Experiment Station which is attached to the National Genetics Institute founded by N. Strampelli, in Italy. Its foundation, aims and equipment and other facilities are described, with a table showing the experiments and trials devoted to the solution of the various problems in the wheat improvement programme from 1937 to 1948. Space is also found for short accounts of the variety testing and regional adaptation studies of other crops, e.g. maize, potatoes, lucerne, hemp, castor oil plant, sunflower, poppy, soya bean and sweet potatoes.
The production of F_1 hybrid maize seed for farmers has also received attention, while work has been begun to obtain virus resistant potatoes to reduce losses due to degeneration.
Vernalization of potatoes should prove of practical value in obtaining an earlier crop.
Sunflower selection for types having a single inflorescence instead of several promises to be successful.
A full account is also given of the organization of seed production and seed control in Italy.

136. Baharev, A. N.
(The vitality of Mičurin's teaching).
Agrobiologija (Agrobiology) 1950 : No. 3 : 12–20.

The more important results in breeding and acclimatization work by the followers of Mičurin in the last 15 years are listed.

The Central Genetical Laboratory
Mention is made of promising new varieties of hazels, hardy vines and early outdoor melons and water melons. An early tomato variety, which matures on 10 to 15 July, under Mičurinsk conditions, has been selected. The hybrid material at the institute exceeds 200,000 plants.

The Mičurin Scientific Research Institute
The institute, which has a network of zonal stations covering the whole of the USSR, has a collection of over 373,000 hybrid plants, including cereals, industrial plants, fruits and vegetables. Several hundred élite seedlings have been selected at the institute or its branches; over 200 new promising fruit trees and bush fruits are still under trial, while more than 100 new varieties of pome fruits, stone fruits and vines have been released as standards for different parts of Russia and Siberia.
Reference is made to new varieties of fruit trees and small fruits obtained by Mičurinite breeders in the Urals and Siberia.

Čeljabinsk Research Station
Several new apple varieties were bred, including the approved standards Kitaïka Abrikosovaja [Apricot Chinese Crab] and Vysokoe [Tall]. Other hybrid varieties, still under trial, include plums and gooseberries.

Novosibirsk Fruit Research Station
New varieties of fruit trees have been selected.

Moscow Research Station for Fruit Trees and Small Bush Fruits
New varieties bred at the institute include the gooseberries Mysovskiĭ [Bay] 37 and Moskovskiĭ [Moscow] 17, and the strawberries Mysovka [Bay], Komsomolka [Komsomol], Desertnaja [Dessert], Aélita [Élite A] and Obiljnaja [Abundant]. All these varieties are adapted to the Non-Black Earth Belt. Mention is made of the new strawberry varieties Krasavica Zogorjja [Ultramontane Beauty] and Pozdnjaja iz Zagorjja [Late Ultramontane], both noted for high yielding capacity, large fruit and good flavour, and of the raspberries Sovetskaja [Soviet], Urožaĭnaja [Productive], Standart, and Kolhoznica [Collective Farmer] all of which yield nearly twice as much as the other cultivated raspberry varieties.

Mičurinite plant breeders
Reference is made to other new varieties of fruits bred by individual Mičurinites. The apples Boris, Zolotoĭ Šar [Golden Globe], Fioletovoe [Mauve], Bezpodobnoe [Unequalled] and Ėvrika [Eureka] were bred at Tambov; over 100 varieties of apples, 8 pears, 6 plums, 37 small bush fruits and 12 varieties of vines were selected in the Čkalov province; several hardy good quality apples were developed at Sverdlovsk; promising new pears from Lesnaja Kracavica [Forest Beauty] x Bere Zimnjaja Mičurina [Mičurin's Winter Beurré], and hardy plums, an apricot, and new vines were bred at Mičurinsk; and new vines, of which the variety Nata is early and bears good quality grapes, were selected at Kaluga.

137. Ohapkin, K. A.
(To an extensive introduction of the best varieties of potatoes and vegetables).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 52–55.

Progress in Soviet selection work with potatoes, vegetables and melons since August 1948 is reported. The achievements, attributed to Mičurinite breeding methods, comprise the development of new varieties and have necessitated a complete revision of the varietal lists.

Potatoes
The number of Soviet bred standard varieties has been enlarged by 11 to a total of 27. The new standards include 8 varieties resistant to wart. Murmanskiĭ [Murmansk], bred at the Arctic Research Station of the USSR Institute of Plant Industry, the wart resistant Bogarnyĭ [Rain-fed], developed at the Šortandino Research Station, Severnaja Roza [Northern Rose], also resistant to wart, selected at the Falenki State Breeding Station, and Peredovik [Leading] at the Institute of Potato Farming, are specially referred to.
Of the older standards developed in Russia, Lorh and Oktjabrenok [Octobrist] 144 proved their value and were made standards for new provinces. On the other hand, several introduced varieties, including Deodara, Geroĭ [Hero] and Maercker were struck off the lists.

The principal aims in potato breeding are productiveness, earliness, good quality tubers and resistance to wart and *Phytophthora*. The need for new varieties is most acute in the arid districts of southern Russia.

Beet

Five new standards remarkable for earliness, productiveness and resistance to drought have been developed: Egipetskaja [Egypt] -AO-473 at the Gribovo Breeding Station; Egipetskaja-K-18 and Egipetskaja-Krosbi [Egypt-Crosby] 220/7 at the USSR Institute of Plant Industry; Egipetskaja 367 and Birjučekutskaja [Birjučiĭ Kut] 313 at the Birjučiĭ Kut Breeding Station.

Mention is also made of Podzimnjaja [Late Autumn] -AO-474 developed at Gribovo, the only non-bolting early, outdoor variety planted in late autumn. The variety has particular scope in the northen districts of the USSR. The main objectives in breeding beet are earliness and resistance to drought and bolting. The acreage for the cultivation of Nesravnennaja [Incomparable] -AO-463, noted for good flavour and attractive colour of its root, a Gribovo selection has been increased.

Carrots

Moskovskaja Zimnjaja [Moscow Winter] -AO-315, selected at Gribovo, has been made a standard. It is productive and keeps well in storage. The acreage for the cultivation of Nesravnennaja [Incomparable] which was developed at Birjučiĭ Kut has been increased. The variety is resistant to drought and very productive. The future programme includes breeding for resistance to *Sclerotinia*.

Cabbage

Braunšveĭgskaja [Braunschweiger (Brunswick)] which is productive, early and has a firm neck, has been made a standard. The acreage under Kaširka 0202, Moskovskaja Pozdnjaja [Moscow Late] 015, Belorusskaja [White Russian] 0455, Kolhoznica [Collective Farmer] 02001 and particularly under Slava [Glory] 1305, selected at Gribovo, has been extended. The last named variety is resistant to bacterial diseases and produces a heavy crop of firm, good quality heads. The aims in breeding are late and medium late varieties resistant to high temperatures and drought. The need for improved seed growing practices is illustrated by the loss of the local varieties Arhangeljskaja [Archangel], Sosykoljskaja, Saburovka [Saburovo] and Kubyška [Dumpy].

Melons

New standards with better economic characters than the former standards include Rannjaja [Early] 8P7, selected at Birjučiĭ Kut, and Bykovskaja 735 and Zimovka [Winter], both developed at the Bykovskaja Research Station. New water melon varieties Dynnyĭ List [Melon Leaf], bred at Birjučiĭ Kut and several varieties developed at Bykovskaja Research Station show promise. The main objectives in breeding melons and water melons are good flavour, transportability, keeping capacity and productiveness under the climatic conditions of northern districts.

Cucumber

Two new varieties, Daljnevostočnyĭ [Far Eastern] 6 and 27 have been made standards. The varieties are productive and resistant to mildew. Daljnevostočnyĭ 6 was selected at the Far Eastern Research Station of the USSR Institute of Plant Industry, and Dalnevostočnyĭ 27 at the Far Eastern Scientific Research Institute of Agriculture and Animal Husbandry. The breeding programme includes the development of productive selfing varieties. The varieties for northern Russia and Siberia must also possess resistance to diseases and the varieties for southern Russia resistance to drought and high temperatures. Seed growing and improvement of élites of the existing Russian varieties Borščagovskiĭ, Berlizovskiĭ, Nežinskiĭ and the land varieties Kungurskiĭ, Tulubjevskiĭ and Vjatskiĭ [Vjatka] require greater attention.

Tomato

Productiveness, large fruit, resistance to diseases and hardiness are the principal breeding aims. Two new varieties have been developed. Alpatjeva [Alpatjev's] 905a is a productive, early and uniformly maturing determinate variety, which can be harvested mechanically. Gruntovyĭ Gribovskiĭ [Outdoor Gribovo] 1180 is productive, hardy and resistant to diseases.

138. Andersson, G.
Utsädesföreningens extra möte under Landbruksveckan 1950. (**Special meeting of the Seed Association during the Agricultural Week 1950**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 290–91.

After a tribute to the late H. Nilsson Ehle, mention was made of a new rape Matador, bred by the Association, and of the new varieties of wheat, barley and oats described in *Plant Breeding Abstracts*, Vol. XX, Abst. 197 and Vol. XXI, Absts 139, 207 and 255. A lecture was then given on the judging of varieties and the system of variety testing in Sweden.

139.
Allmänna Svenska Utsädesaktiebolaget Svalöf. (**General Swedish Seed Co. Ltd, Svalof**).
1950 : Pp. 94.

Åkerman, Å. — *Samarbetet mellan Sveriges Utsädesförening och Allmänna Svenska Utsädesaktiebolaget som förmedlare till allmänheten av Utsädesföreningens sorter. (The cooperation between the Swedish Seed Association and the General Swedish Seed Co. as purveyors of varieties of the Seed Association to the public). (pp. 6–8).*

The successful cooperation between the above two bodies in supplying the Swedish market with new varieties and strains of crop plants is discussed from various aspects.

Åkerman, Å. — *Originalutsäde och dess betydelse för jordbruket. ("Original" seed and its importance for agriculture). (pp. 9–12).*

"Original" seed in Sweden is seed which must be produced by the breeder or in close collaboration with him and under his direct control, whether sold direct by him or by some concern with the same rights as the breeder. The advantages of using such seed, which is subject to élite and pedigree control as well as the regulations for ordinary seed control, are explained.

Åkerman, Å. — *Svalöfs Blendahavre* (01550). [*The Svalöf oat Blenda* (01550)]. (*pp. 12–14*).

The performance and characteristics of the Blenda oat are described in detail (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 8 and Vol. XXI, Abst. 255).

Fröier, K. — *Svalöfs Heimdalkorn. (The Svalöf barley Heimdal). (pp. 14–17).*

Heimdal, formerly designated 02000, is a new malting barley bred from the cross Peragis spring barley x Maja. With improved yield it combines well formed grain, good hectolitre weight and malting qualities. It ripens at about the same time as or possibly somewhat earlier than Maja. Its performance in various comparative trials is recorded (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1328).

Fröier, K. — *Svalöfs Bonuskorn. (The Svalöf barley Bonus). (pp. 18–20).*

Bonus (01518), now on sale from the General Swedish Seed Co., is a 2-rowed barley of the *nutans* type bred from the cross Maja x (Seger [Victory] x Opal). It surpasses its sister variety Ymer and also Maja in yield and closely resembles Ymer in hectolitre weight, time

of ripening, thousand corn weight and shape of kernel. Its straw is as stiff as that of Maja, but not quite equal to the straw of Ymer. It is specially recommended, owing to its yield, for cultivation as a mixture with wheat or oats.

Fröier, K. — *Svalöfs Prestokorn* (*Sv* 01771). *Ny, tidig foderkornsort av sexradstyp.* [*The Svalöf barley Presto* (*Sv* 01771). *A new early, fodder barley of the six-rowed type*]. (*pp. 20–22*).

This new line selection Sv 01771, derived from Juli x Asplund, has yielded 14% more than Brio and 12% more than Asplund in trials at Svalöf. It has surpassed Brio also in strength of straw, but to improve the straw still further crosses and back crosses are to be made with Brio. In ear type Presto resembles a star barley like Asplund, though some variations of the 4-rowed type occur. The grain is of the γ type.

Åsander, F. — *Svalöfs Åsakorn.* (*The Svalöf barley Åsa*). (*pp. 22–24*).

This barley, bred at the Jämtland Branch Station of the Swedish Seed Association from a cross between Dore and Vega, is now on the market (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1328). Its performance as regards yield, earliness and strength of straw is here compared with that of Vega and Dore (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 8). It can be grown in the climatically less favourable parts of Norrland.

Åkerman, Å. — *Svalöfs Ellavårvete* (01050 c_4). [*The Svalöf spring wheat Ella* (01050 c_4)]. (*pp. 24–27*).

The origin and performance of this new élite in various Swedish comparative trials are recorded in detail (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 197).

Åkerberg, E. — *Svalöfs Torsdagsärt III.* [*The Svalöf pea Torsdags III* (*Thursday III*)]. *pp. 27–29*).

The pea here described is a Svalöf selection (Sv 03023) from the land variety Holgerssonärt and resembles the Torsdags II pea in many respects. It has been released for the Swedish market mainly owing to its good performance in Västergötland and Östergötland. It could replace Torsdags II in the whole of southern and central Sweden.

Julén, G. — *Du Puits blålucern.* (*Du Puits blue lucerne*). (*pp. 29–32*).

In the search for a lucerne suitable for Sweden the performance of the variety Du Puits produced by the French firm, Tourneur Frères, by selection from a local strain from Northern France, attracted attention. Du Puits is characterized by very rapid spring growth, high yield, rapid aftergrowth, large leaves (which are not coarse if harvested in time) and abundant flowering. It also gave satisfactory seed yields in Denmark. Trials at various centres in Sweden have shown it to be superior to Grimm and Hungarian lucerne, especially in regard to aftergrowth; as a second year ley its superiority was not so marked. Its winter hardiness, persistence and seed production under Swedish conditions are being studied. So far it has given better sets than any varieties tested.

Tedin, O. — *Svalöfs Evapotatis. Ny, mycket tidig, kräftimmun sort.* (*The Svalöf potato Eva. A new, very early, wart immune variety*). (*pp. 32–34*).

The variety Eva (Sv 42096) bred at Svalöf was released in 1950. Under conditions in Skåne it has been found that by early lifting a good crop as early as Early Puritan can be obtained. At Svalöf and Kullabygden the average yields of the new variety surpassed Early Puritan by 20% and 15% respectively. The flesh is yellowish and the tubers attractive. In quality and flavour it equals Early Puritan. Its keeping quality is good

considering its earliness; it has a higher vitamin C content and is less susceptible to blight and diseases and surpasses Irish Cobbler and Dunbar Yeoman in wart resistance (cf. *Plant Breeding Abstracts,* Vol. XVIII, Abst. 1328).

Fröier, K. — *Svalöfs spånadslin Margareta.* (*The Svalöf fibre flax Margareta*). (*pp. 34–36*).

I. Granhall of Svalöf has bred two successful fibre flaxes, Gerda (0220) and Margareta (0224).
Gerda, released in 1949, is superior to Herkules in yield, strength of straw and fibre quality and has had a favourable report from the growers and factories.
Margareta was obtained from a cross of 036, an old line selected in 1922 from segregating material, by 061 which was derived from Herkules x an Italian flax. Margareta has proved superior by 15% in yield of straw to Herkules and by 6% in yield of seed. Its straw is even stronger that that of Gerda. It is recommended for districts in southern Sweden. In 1944–48, Margareta ripened 2–3 days later than Herkules, but the quality of the flax was not adversely affected. The Flax Laboratory of the Swedish Seed Association has reported favourably on the quality of the fibre which is about equal to that of Gerda (cf. *Plant Breeding Abstracts,* Vol. XVIII, Abst. 617 and Vol. XXI, Abst. 451).

Andersson, G. — *Svalöfs Primex vitsenap.* (*The Svalöf white mustard Primex*). (*pp. 36–38*).

This variety of white mustard, obtained by X-irradiation of ordinary white mustard, has yellow seeds and flowers, but also produces occasional plants of a paler yellow which at the same time shows a golden tinge, a variation which serves to identify Primex (Sv 0401) at the flowering stage. In numerous trials during 1944–49 Primex surpassed ordinary white mustard in seed yield by 4% on the average, while for oil content the respective average figures for Primex and ordinary mustard were 30·3% and 29·4%, which corresponds to a superiority in kg. of oil per ha. of 6% in favour of Primex.

Andersson, G. — *Svalöfs Gute vårrybs.* (*The Svalöf spring turnip rape Gute*). (*pp.* 39–40).

This new turnip rape is an F_1 population from five different varieties Sv 0300 and Sv 0302-Sv 0305 which were mixed and grown together. Externally it is indistinguishable from Sv 0300, but on some soils it has surpassed Sv 0300 by 3% in yield, though itself surpassed by 11% by Svalöf Regina; on peat soil, however, it exceeded Sv 0300 by 11% and Regina by 32%. On an average from two trials, the oil content was 41·4% for the new variety as compared with 40·3% for Sv 0300 and 40·5% for Regina. Svalöf Gute ripened in 96 days, Sv 0300 in 95, and Regina in 115 days in some experiments, but on peat soil the new variety required only 96 days, while Regina took 117 days to reach maturity. As regards erectness of habit, Svalöf Gute was graded as 7·3, Sv 0300 as 6·4, and Regina as 6·8, 10 points being the maximum, awarded for completely erect stems.

Andersson, G. — *Svalöfs Ugra soja.* (*The Svalöf soya bean Ugra*). (*pp. 41–42*).

Sweden requires a soya bean that is early and will ripen every year in the south east. The most successful method of breeding has been crossing early varieties. After a long period of testing, some of the hybrid lines have proved superior to the best foreign varieties and one brown seeded line Sv 0900, later named Ugra, was to be put on the market in 1950. It was derived from a cross of the black seeded variety Wisconsin and the brown seeded Brunatna Vilenska [Brown Vilno] and during 1945–49 it surpassed Vilnensis in yield by 43%, averaging 1201 kg. per ha. in 18 trials, as compared with 839 kg. for Vilnensis. Ugra also ripened in 131 days, i.e. ten days earlier than Vilnensis which it also surpassed in oil content, averaging 17·6% in five experiments, as compared with 15·7%. Vilnensis was, however, superior in protein content and thousand seed weight, though not in virus resistance.
Ugra is recommended to replace Vilnensis and Altonagaard.

Fröier, K. — *Svalöfs bruna spritböna Ahle* (*Sv* 03). [*The Svalöf brown bean Ahle* (*Sv* 03)]. (*pp. 43–44*).

This new Swedish bean was obtained by selection of material from the Ahleborg estate near Gunnarstorp and has undergone trials at Svalöf, Kalmar, Ultuna and Alnarp. Its yield is 13% higher than Stella and it ripens at the same time, but its seeds are smaller (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 651).

Fröier, K. — *Svalöfs Valuta oljelin.* (*The Svalöf linseed Valuta*). (*pp. 44–48*).

The superiority of Valuta linseed in trials with Swedish, Danish and other varieties is recorded. The only variety that could compete with it was the Finnish linseed, Vaanila, which gave a relative yield of 98·6 of seed as compared with 100 for Valuta in one group of 22 experiments (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 146 and Vol. XX, Abst. 8).

Josefsson, A. — *Svalöfs rotfruktsstammar i Utsädesföreningens försök.* (*Svalöf's root crop strains in trials of the Seed Association*). (*pp. 48–50*).

The uses and qualities of swedes, turnips and the various types of beets are considered with a few examples drawn mainly from well-known Svalöf strains (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1461).

140. Dam Kofoed, A.
49. Beretning om Planteavlsarbejdet i Landboforeningerne i Jylland. **(Forty-ninth report on plant production work in the agricultural societies in Jutland).**
Skanderborg 1949 (1950) : Pp. 493.

This annual report, compiled by the Association of Plant Production Committees of the Jutland Agricultural Societies, provides a detailed account of the work done on crop production by the Jutland agricultural societies and on their organization and membership. The performance of numerous varieties and strains of wheat, rye, barley, oats, maize, peas, potatoes, root crops, lucerne and clovers in trials at various places in Jutland is recorded in a section on local field experiments.

141. Drost [Dorst], J. C.
Breve descripción de las principales actividades del Instituto para el Mejoramiento de las Plantas de Gran Cultivo, en Wageningen, Holanda. **(Short description of the principal activities of the Crop Breeding Institute at Wageningen, Holland).**
Bol. Produc. Fomento Agríc. 1950 : **2** : No. 10 : 13–18.

A review in Spanish is presented of the plant breeding work at Wageningen.

142. Chavan, V. M. and
Bhat, N. R.
Causes for the low yields of food crops in India and measures suggested to improve them.
Poona Agric. Coll. Mag. 1950 : **41** : 99–109.

The improvement of food crops by introduction, selection and hybridization is briefly discussed.

143.

Administration Report of the Director of Agriculture for 1948. Part 4—Education, science and art (D).
Dep. Agric. Ceylon 1950 : Pp. 182.

Rice
In work by the Division of Botany the variety Vellai Illankalayan—28061 is being used in breeding for non-shattering. At Rikiligaskade, selection of Hetapandurawi, a variety notable for its ratooning qualities, was carried out. Selection of varieties for high elevations was initiated at Hellbodde.
Selection work was carried out by the North-Western and North-Central Divisions. Hybridization was also included in the work of the latter Division, crosses being made between promising selections of Vellai Illankalayan, Dihwee, Sulai and Honderawala as one set of parents and selected Indian and Burmese varieties as the other set, with a view to introducing resistance to lodging into the local varieties and improving their milling qualities.

Cotton
Seed of the medium staple cotton BP79 is being supplied to cultivators from the Cotton Seed Station, Wirawila.

Cassava
A study was made of the floral biology of cassava as part of the breeding programme being carried out by the Division of Botany. Hybridization was effected between MU41, a high yielding variety with very high content of hydrocyanic acid, and MU51 and MU59, varieties with good flavour and low content of hydrocyanic acid. Most of the F_1 hybrids had a hydrocyanic acid content approaching the level of that of MU41; three of the hybrids however had satisfactorily low content.

Tobacco
In preliminary trials at the Hingurakgoda Farm the following American varieties of Virginian tobacco gave good results in smoking tests: Harrison's Special, Cash, Yellow Mammoth, Mammoth Gold and Virginian Bright Leaf. These tobaccos are to be subjected to trials on a larger scale and finally selection for adapted strains. The mild cigar varieties Broadleaf, Washington and Narrowleaf have shown superiority over the local Dumbara strains in yield and quality.

Tea
Resistance to blister blight is receiving increasing attention.

Cacao
Yield recording of selected trees on the Kundasae Estate was begun.

Rubber
The long term study of local and foreign clones has been continued. In view of their promising performance four of the NAB clones developed under the Rubber Research Scheme are to be tested on a larger scale.

Groundnut
The progenies of single plant selections obtained from an erect Uganda variety are under observation by the North-Central Division.

Coconut
Second generation progeny testing has been begun at Walpita.

144.

Rapport sur les travaux de recherche effectués en 1948. **(Report on the research carried out in 1948).**
Bull. Serv. Bot. Agron. Tunis 1949 : No. 15 : Pp. 87.

This report deals with work carried out under the Tunis Botanical and Agronomic Service and in the plant laboratories of the Colonial Agricultural School, Tunis. Activities

included a first-hand study of American methods in cereal breeding and research organization; investigations on mass selection and yield from pure lines; self-fertilization of wheat, and genetic studies of wheat varieties.

Plant Genetics Laboratory

About 7,000 lines of soft and hard wheats, barleys and oats have been retained and sown in 1948-49.

Comparative trials of cereals are in progress. Four hard wheats Sindyouk x Mahmoudi K14, Hedba x Kahla 148, D115 (Derbessi x Biskri) x M'Rari 1r5 and D116, Sbéi x M'Rari 11 1r20 have shown good resistance to lodging and black rust, as well as higher yields than the control Mahmoudi 552.

The soft wheat line T111 bis. 113 : Pusa x (Florence x Aurore) still retains its superiority to Ariana 8 in yield and black rust resistance.

The special study of rust resistance at Montpellier, France (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2155) has been continued.

The system of large-scale regional trials is being widely applied with successful results.

Experiments on yield tests in small cement containers are being made.

A study of the relation between the weight of the ear and of its grain has shown that the correlation is almost perfect and ear weight can therefore be used in estimating the productivity of lines. Whether the weight of a number of ears would be a satisfactory measure of the yield from plots has still to be verified.

A mission visited Italy to study the cereal breeding at various institutes; samples of the best soft wheats of recent origin were obtained and an exchange of cereals and other plants was established.

The Laboratory for Fungous Diseases

Plot trials of black rust resistance of 26 wheats, each represented by 4 plants, showed some degree of infection in nearly all the varieties, the incidence being specially high in lines of a "compact" type of wheat which is thought to have arisen by mutation from Florence x Aurore. The most resistant were two lines of the soft wheat Kenya, a selection of the hard wheat Sindyouk x Mahmoudi, and the hard wheat Mahmoudi 552.

Genetical and ecological studies have been begun on black rust, for which some new strains of susceptible varieties have been obtained from America.

The Laboratory of Agricultural Chemistry

A number of economic plants, including fruit and nut trees, various vegetables and flax were tested for tolerance to NaCl.

Market Garden Crop Laboratory

Tobacco

Analyses of the alkaloid content of 45 varieties of *Nicotiana Tabacum* introduced from various countries are in progress. Five selections, made in Germany, had been chosen for low nicotine content.

Tomato

In the course of tomato selection for industrial use 50 lines of the hardy, local population Canatella have been analysed and a spherical and an elongated type have been identified. Future selection should concentrate on productivity and high yield of dry matter.

The hydroponic technique has been found useful in preliminary elimination trials of various vegetable crops and advantage has also been taken of winter cultivation in the unheated greenhouse in tomato selection for earliness and yield.

Introductions of foreign plant material have comprised nine varieties, included in trials of 30, but the only variety worth retaining as comparable with Canatella was Gloire du Rhin [Glory of the Rhine]. Early Chatham, recognized as exceptionally early, has been reported in some cases to produce too many small fruits.

Other Crops

During the year 510 species and varieties of kitchen garden plants and medicinal plants were introduced from various countries including Italy, Morocco, USA, Tripolitania and France; exchanges of plant material have also been arranged with various agricultural and botanical research stations.

The Cereal Technology Laboratory
Determinations of the industrial value of selections of soft and hard wheat were carried out, as well as research on the best method of studying the resistance of hard wheats to mealy endosperm and on nitrogen estimation.
Tests of the improvement value of Florence x Aurore and Manitoba showed one lot of Florence x Aurore to be superior to the Canadian wheat. The improvement values of the wheats tested were found to run parallel with the gluten content.

Botanical Laboratory
A survey of the flora of Tunis and work in the herbarium for Tunisian plant specimens are reported.

Laboratory of Fruit Tree Cultivation
Collections of orchard fruits are being made with a view to replacing some varieties and to introductions of new fruit trees.
An attempt is being made to cross the Spanish apricot, Caninos, with the local mech-mech, Hamidi, to obtain a new, earlier variety with the qualities of the Spanish type. Work is also in progress to devise a method of multiplying *Pistacia vera* vegetatively and *P. Terebinthus* was used as a stock in two series of these experiments.

Botanical Laboratory of the Colonial School of Agriculture, Tunis
The principal varieties of vines in the School's collection are being studied as regards their performance when grafted on American stocks. Regional comparative trials of hybrid vines are being continued and three white and three red varieties have shown promise.
Selection of clones and numerous new crosses were also carried out in addition to studies of segregation in Beldi x Sultanine, from which it is hoped to obtain a fertile vine with large seedless grapes. A study of calcium tolerance of stocks is also contemplated.

145.

Rapport sur les travaux de la Société pendant l'année 1947–48. (**Report on the work of the Society during the year 1947-48**).
Société Royale d'Agriculture, Cairo 1949 : Pp. 78.

This report includes a record of the progress made in selection and plant breeding applied to various crops. The general principles adopted in the plant breeding operations consist in selection of pure lines, hybridization and the study of segregates, the fixing of constant desirable types, cytological investigation of the breeding material, and improved methods in seed production. Some results are given below:—

Bread Cereals
Selection and hybridization of wheats and barleys are proceeding to obtain breeding material combining productivity, quality and rust resistance. The high grade wheats Toussoun and Bouhi, bred by the Egyptian Royal Society of Agriculture, are being crossed with Giza 139, Moukhtar, Hindi [Indian] 62, Hindi 722, Baladi [Local] 116 and some foreign rust immune varieties. Back crossing is also being used with other F_2 material and the resulting lines are to be cytologically studied. In this case the parent lines have been Hindi 62, Hindi Maarad, Giza 4, Hindi Gamia [Indian Collection], Hindi 722, Baladi 116, Toussoun, Bouhi and Dakar. In similar work with barleys new lines have been produced from crosses involving Nabatat, Kamali [Perfect] and Baladi 16.
Wheats are also being raised under conditions favourable to rust and chlorosis in order to determine varietal resistance or susceptibility. Incidentally a type of chlorosis has been found whose origin may also possibly be genetic like the better known type above referred to.

Maize
Pure lines, now in the F_8, are being classified into families on the basis of their characteristics, with a view to the production of hybrid varieties. Some crosses already made have failed to exhibit heterosis and suitable combinations must still be sought.
Selection for multiple ears is proving successful in increasing ear size and number of kernels. The genetical study of this character is being confined to plants with stems bearing 4–6 ears

each, as such plants have shown high quality and have retained the characteristics of the line chosen for its particular number of ears, size of ear and numerous kernels. This line is also being crossed with an American line and the F_1 is being back-crossed to obtain an improved type with as many ears as possible. The same line has proved superior in trials to the commercial varieties Guizaoui and Guiza Baladi [Giza Local] and closely resembles the American early maize which is still the best variety undergoing tests. Reaction to manuring is also being investigated.

Experiments have confirmed that the yields obtained from kernels taken from the ear at different levels and from ears of different shapes and volume tend to be remarkably similar in all cases, i.e. like those of the particular parent plant concerned.

Rice

A further study is being made of the hybrid line 13–3–1, noted for its large grain, as compared with all the other Japanese varieties known in Egypt. Unfortunately it is weak in tillering capacity, which reduces the yield. Moreover, Assahi Gamia has invariably exceeded 13–3–1 in yield. Selection for improved tillering in 13–3–1 is in progress. Some new hybrids may, it is hoped, combine large grain with abundant tillering.

Some lines imported from Spain and Brazil are being studied. The Spanish lines, which are early ripening, are being crossed with Assahi, and with 13–3–1. The Brazilian lines have large grain.

Cotton

Lines are being studied in field and laboratory and with the assistance of commerical experts who assess their value as compared with recognized varieties.

Improved lines derived from individual selections include the early varieties 190/48 and 68/48. The former has long white fibre and a comparatively good ginning outturn and has proved immune to wilt when grown in infected soil. Line 68/48 surpassed all the commerical varieties in its lint, which is of medium length, and also showed the highest ginning outturn as well as being immune to wilt.

Hybrid lines are still segregating and selection is proceeding.

A large scale programme of hybridization is being carried out to improve certain varieties and lines, to study the genetical basis of various characters and to obtain types resistant to insect attack. By using a hairy cotton as one parent, hybrids have been obtained in which among 300 plants eggs were laid only on 12 places and less than half hatched and the larvae died immediately afterwards. Back crossing is also being used but it is too early to discuss results.

Seed Production

The Division for Seed Multiplication continues to be concerned with cotton, wheat, barley, clover and rice, using either (*a*) pure lines supplied by the Division of Botany or (*b*) the best quality of seed that the growers possess. In discussing the different varieties of the above crop plants, the rice Yabani Gamia [Japanese Collection] imported from Japan is mentioned as particularly popular.

Pure lines of cotton have been maintained and selection work is to be undertaken with the varieties produced by the Egyptian Royal Agricultural Society. The demand for the varieties Karnak, Menoufi, Giza 7, Giza 30 and Ahmuni and Zagora is recorded with observations on the qualities or circumstances determining any differences in their popularity.

146.

Annual Report of the East African Agriculture and Forestry Research Organisation for the year 1949 : Pp. 44.

Cassava

Work on breeding for resistance to mosaic and brown streak by interspecific hybridization of cultivated cassava with woody-rooted wild species of *Manihot* continued at Amani. In a preliminary trial of clones resulting from the 1947 breeding season, a group of F_1 *M. melanobasis* hybrids exhibited a high degree of resistance to brown streak; probably only

one back cross will suffice to restore the character of fully tuberous roots in this material. *M. melanobasis* is susceptible to mosaic but it may be possible to introduce factors for resistance by triple hybridization. Apart from its brown streak resistance the species is valuable in breeding on account of the high protein content of the roots. In the 1948–49 replicated trial, 8 of the 60 clones were free from mosaic; 6 of these 8 clones were highly resistant to brown streak but only 1 produced a satisfactory root yield.
The high yielding but mosaic susceptible ceara-cassava hybrid, 4332/2, is being tested against the cassava variety Msitu at Kizugu, in order to decide whether its extensive cultivation is worth while pending the production of high yielding disease resistant types.

Groundnut
In agreement with the Overseas Food Corporation, the East African Agriculture and Forestry Research Organization is responsible for research on basic problems of virus diseases. Grafting experiments with the variety Natal Common have resulted in the differentiation of two main groups of viruses according to the symptoms produced: the rosette and mottle types.
Testing of *Arachis* spp. for virus resistance is receiving attention, as a preliminary to imparting resistance to *A. hypogaea* by interspecific hybridization.

Cupressus
Tests are to be carried out on the resistance of *C. macrocarpa* and other species to canker (*Momochaetia unicornis*).

147.

Annual Report of the Department of Agriculture, Colony and Protectorate of Kenya 1948.
(1950) : Parts I–III : Pp. 228.

Pyrethrum
Promising lines with high content of pyrethrins, derived from single plant selections, have now been established in pairs in isolated plots for seed production and progeny trials.
At Molo nine crosses were being compared in a progeny yield trial; three have given pyrethrin contents of over 3%. The results indicate the need for high pyrethrin content in both parents for the production of high content in the progeny.

Wheat
The occurrence of a new physiological race of black stem rust, designated K8, necessitates reexamination of the breeding programme. In the seedling tests so far carried out Kenya Governor and three other wheats have exhibited resistance to K8.
The following wheats were released to farmers: 318AJ4A1, a beardless, white chaffed and white grained selection from the cross of DC with Ceres 721 x 112E8L5, resistant to the 8 known races of black stem rust occurring in Kenya, fairly resistant to leaf rust, and resistant to yellow ear rust up to an altitude of approximately 8000 ft.; 261R7C1B, a bearded, white chaffed and light grained wheat from the cross 68E12A1 x Reliance, resistant to the black stem races K1 to K7 and probably also to K8, and fairly resistant to leaf and yellow ear rust up to about 7000 ft.; 117A11, a pure and uniform selection of 117A; and Rhodesian Sabanero.
The numerous new hybrids and introductions under investigation at the Plant Breeding Station, Njoro, Scott Agricultural Laboratories and the Molo Substation are listed. At Njoro, seed has been obtained from the back cross of *Triticum timococcum* x Marquis to Regent and Newthatch; in a series of crosses now in the F_4 the Australian wheat Warigo has been successfully used as a source of resistance to leaf rust; new crosses have been made with the object of combining the straw strength and baking quality of one parent, in particular Regent, and the rust resistance of the second parent. At the Scott Agricultural Laboratories, the hybrids 356 (184P2A1F x 192Q2AL) and 358 (184P2A1F x 294B2A3) remained free from stem rust; promising segregates from these crosses are to be carried on to multiplication plots. At Molo new hybrid varieties were tested with a view to finding a

suitable substitute for the wheat Equator, which lacks satisfactory baking quality and yellow rust resistance.

Oats

Varieties were tested at Njoro and Molo.

Maize

Hybrids introduced from the United States were surpassed in yield by both the local maize and a hybrid (N3–1 x M9–9) from Southern Rhodesia. The breeding of hybrids chiefly from local strains is planned.

Barley

Two varieties, Research from Victoria, Australia, and Glacier from the United States, have been released. Information is given on yield trials and the performance of recent introductions.

Potato

Additional blight immune varieties were received from Britain and grown at the Scott Agricultural Laboratories for testing and multiplication. The most promising varieties tested during the year were 914a(12) and 1427a(8).

Coffee

Trials of selections on the Anmer and other estates continued.

Sunflower

Trials of the semidwarf varieties Mass, Jupiter and Pole Star were carried out in comparison with the standard Russian variety Giant Black. The seed of the semidwarf varieties ripened unevenly but showed an improvement in this respect compared with the standard. Single plant selections have been obtained from the semidwarf sunflower.

Soya bean

Varieties from the United States and other countries were subjected to trial.

148.

Memorandum on long term policy.
Food Production Board, Mauritius, 1950 : Pp. 25.

Recommendations are made concerning experimental work including the breeding, selection and introduction of varieties of food crops other than sugar cane. The introduction of hybrid maize is recommended.

149.

Forty-third Annual Report of the Department of Agriculture, Province of British Columbia 1948 (1949) : Pp. 228.

Maize

Tests of hybrid field maize were carried out.

Potato

The introduction of the blight resistant varieties Ashworth, Chenango, Essex, Placid and Virgil for further trial is recommended.

Strawberry

Varietal tests of resistance to red core in the Fraser Valley indicated that Temple, Pitt, Pathfinder and US3378 might prove useful for this district.

Tomato

Varieties were studied for their resistance to *Verticillium* wilt and other characters at the Pugh Ranch; FEF 29·2 was the best of the resistant varieties as regards quality.

150.

Forty-fourth Annual Report of the Department of Agriculture, Province of British Columbia 1949 (1950) : Pp. 239.

Black currant
Information is given on the performance of the varieties Ottawa 381 and 393, now named Crusader and Coronet respectively; they have proved resistant to white pine blister blight.

Strawberry
Pathfinder and Temple maintained their promise as useful red core resistant varieties for growing in the Fraser Valley.

Tomato
Tests of V473, V4802 and V4803, three new mould resistant varieties for greenhouse cultivation, developed at the Ontario Experimental Station, Vineland, are reported.

Sweet corn
Varieties and hybrids were tested in Vancouver.

151.

Report of the Minister of Agriculture of the Province of Quebec for the year ending March 31st 1948 : Pp. 126.

Dechambault Ste Foy

Pimento
Hybridization is in progress.

Strawberry
Improvement is concerned with the development of late maturing varieties suitable for production after the usual strawberry season.

Grape
Breeding work has as its objective the production of a hybrid possessing hardiness, frost resistance and both satisfactory industrial and table qualities.

Melon
Hybridization was begun.

Tomato
Hybridization is being carried out on the variety Quebec to increase its earliness while at the same time maintaining its fruit size.

Sweet corn
Breeding work aims at the development of an early variety adapted to the colder northern districts.

Macdonald College

Maize
A special study of combining ability has been begun.

Clover
Ladino clover is being selected for hardiness. Red clover selection is receiving attention; seed of an early strain of Dollard was multiplied.

152. Wellhausen, E. J.
Rockefeller Foundation collaboration in agricultural research in Mexico.
Agron. J. 1950 : 42 : 167–75.

An account is included of breeding work on maize, wheat and beans.

153. HARRAR, J. G.
Mexican agricultural program. A review of the first six years of activity under the joint auspices of the Mexican Government and the Rockefeller Foundation.
New York 1950 : Pp. 36.

This review of the first six years of activities conducted under the joint auspices of the Mexican Government and the Rockefeller Foundation refers to plant introduction work and maize, wheat and bean breeding (cf. Abst. 152).

154.
Investigations 1948-1949.
Bull. Dep. Agric. Jamaica 1950 : No. 45 : Pp. 110.

In addition to the activities summarized below, varietal trials were carried out on local food crops, maize, rice, forage grasses and legumes, fibre crops, linseed, groundnut, soya bean and furniture bamboos.

Coffee

Selection of trees with high yield and quality continued. Selected trees must possess a potential yielding capacity of 15 cwt per acre.

Cacao

Introduction and multiplication of improved strains from the Imperial College of Agriculture, Trinidad, were carried out. Local selections from St Anne were also multiplied for the production of buddings.

Cashew

Recording work has been begun at the Irwin Agricultural Station in the hope of selecting desirable high yielding types.

Banana

Breeding work aims at the production of a commerical variety immune from Panama disease and resistant to leaf spot.

Research work hitherto conducted by the Department of Agriculture has now been taken over as part of the West Indies Banana Research Scheme which is under the aegis of the Imperial College of Agriculture, Trinidad. In Jamaica the scheme is based on the Banana Breeding Station now being established on a site adjoining the Bodles Agricultural Station, St Catherine. As soon as the current work is completed the Department will deal only with agronomic and cold storage trials on material propagated from promising seedlings issued from the Banana Breeding Station.

Pisang Lilan (*Musa acuminata*) is the only male parent to be retained. At the Breeding Station crossing has been limited to the use of the triploids Gros Michel and Highgate as female parents and Pisang Lilan and selected synthesized diploids from Trinidad as male parents.

Plots for testing the disease resistance of new seedlings were maintained at the Caenwood and Bodles Agricultural Stations.

Observations are being made on the varieties Lacatan and Robusta when grown in four different ecological areas, with a view to determining morphological differences for the purpose of identification.

155. PRIDHAM, A. M. S.
See research at New York stations.
Amer. Nurserym. 1950 : **92** : No. 5 : 13–14, 60–65.

Reference is made to plant breeding work at the experiment station at Geneva including the development of scab resistant apple varieties and the breeding of small fruits.

156.

Science and the land.
The 70th Annual Report of the New Jersey Agricultural Experiment Station, 1948–49 : Pp. 158.

Wheat
Breeding is being carried out.

Oats
Promising new varieties of winter oats are under trial. Increased attention is being given to breeding for stiff straw in the more winter hardy varieties. In an extensive three years' test Clinton maintained its position as the best spring oat for New Jersey.

Maize
The new double hybrid NJ7 was released; in four years' tests it has proved superior to all other recommended hybrids in yield. NJ7 is highly resistant to root lodging and stalk rot, and matures at about the same time as US13 and NJ2. Its parentage consists of two of the inbreds from which US13 is derived, and two of the inbreds forming the parentage of NJ4.

Barley
Progenies of crosses involving the winter barley Wong are under test for possible superiority over this variety; high yielding capacity, stiff straw and mildew resistance are forming the basis of selection.

Forage legumes
Strains of US clover and lucerne are being selected for resistance to *Sclerotinia* crown rot in an attempt to find material for breeding resistant varieties.
According to preliminary results, high yielding lucerne plants can be identified by examination of seedlings when only 6 to 8 weeks old; early selection is thus possible.
Alsike breeding is in progress.

Apple
Breeding for semistandard sized trees is being attempted. Scab resistance is receiving attention in breeding work. New crosses were effected with the main object of developing early red apples.

Pear
A collection has been assembled as the basis of breeding for fire blight resistance and high quality.

Peach
The white fleshed variety Maybelle, the earliest peach so far introduced by the New Jersey Agricultural Experiment Station, was released (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 515).
A rapid technique, based upon measurement of the difference in colour reflection from the leaves, has been developed which makes possible the distinction of yellow and white fleshed varieties at the young seedling stage.
Varietal differences in susceptibility to manganese deficiency as indicated by leaf pattern have been noted.

Beach plum
Selection NJ1 has been introduced under the name Raribank (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1867).

Blueberry
Seedlings from crosses made in an attempt to develop varieties with fruits ripening throughout the season and with a more satisfactory scar and thus improved keeping quality are being studied. The new varieties Coville and Berkeley were named and introduced (cf. *Plant Breeding Abstracts*, Vol. XX, Absts. 1151 and 2612).

Rhubarb
A one-year-old seedling from a cross between Sutton's Seedless and MacDonald shows a dark red colour on both the outside and inside of the petiole.

Tomato
Selections of Valiant x Rogers are under test as early market tomatoes; the most promising selection will be released and named Queens.

Soya bean
Earliness of maturity is conditioned by a few major and many minor factors; the tendency to mature early appears to be recessive.

Sweet corn
Breeding work aims at the production of a variety combining high yield, good quality, earliness, cold hardiness for earlier planting, resistance to wilt, smut, ear worm, sap beetle and borer, strong roots and stalks to prevent lodging, and suitability for efficient seed production.

157. COLEMAN, R.
A year of research in Mississippi farm problems.
Miss. Fm Res. 1948 : **11** : No. 7 : p. 3: No. 8 : 3–5.

Work at the Central Experiment Station and the branch stations is summarized (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 668).

158. WELCH, F. J.
Year's record of research in Mississippi farm problems.
Miss. Fm Res. 1949 : **12** : No. 8 : 3–8.

Some of the investigations described here have already been referred to in *Plant Breeding Abstracts* (cf. Vol. XX, Abst. 2172). In addition, breeding work with bell peppers and peas, and varietal tests with various crops including sugar cane, tung and lucerne are reported.
A breeding programme to develop varieties of bell pepper better adapted to the area was initiated at the Truck Crops Branch Station during the winter of 1948–49. Selections from all lines and hybrids of peas in the breeding nursery were made at this station; several F_4 lines appeared promising.
The Delta Branch Station produced seed for the release of a new, early oat variety of unspecified origin, Delair, which is characterized by high yields, vigorous growth, stiff straw, and resistance to *Helminthosporium* blight but is susceptible to one type of crown rust.

159.
Research in agriculture.
Annual report of the Agricultural Experiment Station, Louisiana State University and Agricultural and Mechanical College, Baton Rouge, Louisiana 1948–49 : Pp. 196.

Oats
In work on *Helminthosporium* blight resistant material, the variety Alber and lines of Camellia and other strains have been reselected.

Maize
Experimental hybrids were tested.

Rice
Breeding work continued. The following varieties were grown by farmers on a trial basis: Rexoro x Fortuna, Sel. 322A6–23; Rexoro x Purple Leaf, Sel. 3–72–3; Blue Rose x (Blue Rose x Rexoro), Sels 61–25–12 and 31–9–2–4.
The present trend in market preference is towards the long slender grained types. The following selections of this kind were notable in the 1949 tests: Century (Texas Patna x

Rexoro-Supreme Blue Rose); a selection from Rexoro x Zenith; Rexoro x (Blue Rose x Rexoro), Sels 4II–1–8 and 4II–4–1–11; Rexoro² x (Blue Rose x Rexoro) Sel. 7/8 Rex. –3–12.

White clover

Varieties are under trial which have been developed by combining selected clonal lines from seed collected in fields of native stocks; these lines have excelled in heat tolerance, vegetative vigour and seed production. Polycrosses of clonal lines gave higher yields of forage than Ladino.

Potato

Breeding work in cooperation with the US Department of Agriculture continued.

Sweet potato

Seedlings with almost three times the carotene content of the standard variety Unit I Porto Rico have been developed. Seedling 9–49 has practically 10% more solids and 1% more carotene than the standard. Of the starch types seedling L–230 is 4% higher in solids content that the standard fodder and starch varieties Pelican Processer and Whitestar. As a result of extensive yield trials, seedling L–241 is considered the best all-round variety; it produces a higher percentage of No. 1 potatoes and is about twice as high in carotene as Unit Porto Rico; it is resistant to wilt and moderately resistant to soil rot.

Cotton

Breeding work continued. The factors for resistance to *Fusarium* wilt and bacterial blight have been transferred to the best commercial varieties; the hybrid progenies are to be further tested for suitable agronomic characters. With the establishment of a modern fibre laboratory at the Louisiana State University breeding work on fibre quality has been intensified. Some varieties carry genes for very strong cotton; these are to be used in crosses with varieties possessing superior fibre qualities.

Sugar cane

Tests of commercial varieties and new seedlings are reported. The new canes CP 44–101 and CP 44–155 were released (cf. Abst. 474). CP 44–101 is midseason in maturity, with satisfactory sucrose content. CP 44–155 has given good yields of cane per acre on the more fertile, well-drained soil types in the river area, where it has shown early maturity and good sucrose content.

Shallot

Some F_1 amphidiploids from crosses of Nebuka with the Southport White Globe and White Portugal onions appeared to be resistant to both pink root and yellow dwarf.

Cabbage

The recently introduced variety Louisiana Allyear (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 768) was grown as an autumn crop in yield trials. It outyielded all other varieties except Glory of Enkhuizen; the differences in yield between the two varieties, however, were not significant. Louisiana Allyear was more resistant to mildew, black rot and weather damage than the other varieties tested.

Lima bean

In recent years tests have been made of selections from crosses between Carolina Sieva, a small-seeded pole bean, well suited to the south, and Fordhook, a large seeded Lima bean from the northern States possessing high table quality. Two of these selections, L–1–1, a small seeded bean, and L39–11F, a medium sized bean with a pod which shells very easily, are now being increased for distribution. Selection L1–1 produces beans with a high sugar content and sets a large number of pods per flower cluster. Selection L39–11F will probably be named Easyshell. Its pods are much larger than those of other southern varieties and its beans are of higher quality.

Soya bean

The chief objective of the breeding programme since 1929 has been the development of varieties with high yields of forage and satisfactory yields of yellow seed suitable for crushing.

The new variety Louisiana 41–1219 (Tanloxi x PI 60406) is to be released. It is suitable for those districts in Louisiana where high forage yields are required for soil improvement and hay. The yellow seed is high in oil and protein; the commerical quality of the seed is good, although the variety tends to produce some rather small seed under adverse growing conditions. Previous releases include Pelican (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 536) and Acadian (PI 60406 x PI 04910).

160.

Sixty Second Annual Report 1948-49 of the Colorado Agricultural Experiment Station. Pp. 31.

Wheat
Breeding for leaf and stem rust resistance is being carried out.

Maize
Hybrid production is in progress.

Barley
Breeding for smut resistance is receiving attention.

Lucerne
Lines with improved seed setting capacity have been obtained in the variety Hardistan by selection of maternal lines.

Potato
The new scab resistant variety Yampa is to be introduced in cooperation with the US Department of Agriculture (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2304).

Onion
Hybrid trials were continued. Breeding for pink root resistance is in progress.

Beans
Varietal differences in disease resistance have been observed. Certain Idaho varieties and San Juan selections have so far given the best performance in a five year test.

Peas
Resistance to root rots is being sought in breeding.

161. Dion, H. G.
Agriculture in the Altiplano of Bolivia.
FAO Washington 1950 : Development Paper No. 4 : Pp. 33.

Recommendations for the improvement of wheat, barley, rye, potatoes and quinoa (*Chenopodium Quinoa*) by introduction, selection and breeding are included.

162.

Memoria que presenta el Ministerio de Agricultura y Cría al Congreso de los Estados Unidos de Venezuela, en sus sesiones ordinarias de 1948. (**Report presented by the Ministry of Agriculture to the Congress of the United States of Venezuela, at its ordinary session, 1948**). 1948 : Pp. 279.

Brief mention is made of work in Venezuela on the introduction, selection and breeding of the following crops: maize, popcorn, sorghum, rice, lucerne, potatoes, cassava, cotton, agave, jute, tobacco, sesame and beans.

163. Tschermak-Seysenegg, E.
Herman Nilsson-Ehle—zum Gedenken. (**Herman Nilsson-Ehle—in memoriam**).
Z. Pflanzenz. 1950 : **29** : 1–5.

Müntzing, A.
Lebensbeschreibung von Herman Nilsson-Ehle *12.2.1873 †29.12.1949. (**Biography of Herman Nilsson-Ehle *12.2.1873 †29.12.1949**).
Ibid. 1950 : **29** : 110–14.

The life and work of H. Nilsson-Ehle are described.

164.
Convegno di genetica agraria a Rieti. (**Meeting on agricultural genetics at Rieti**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1950 : **34** : 87–93.

Reference is made to the meeting on agricultural genetics held at Rieti in May-June 1950 (cf. Abst. 165). The paper by A. Morettini on fruit breeding in Italy is reproduced in full.

165.
Agricultural genetics. Conference at Rieti.
Nature, Lond. 1950 : **166** : 292–94.

Agricultural Genetics Meeting.
FAO European Bull. 1950 : No. 2 : 83–86.

Summaries are given of addresses presented at the meeting on agricultural genetics held at Rieti during May 30 to June 3, organized by the Italian Society of Genetics and Eugenics and the Rieti Chamber of Commerce, Industry and Agriculture.
In the opening address P. S. Hudson spoke on "Genetics and agriculture in international organization," describing the work of FAO on the world cataloguing of genetic stocks.
Å. Gustafsson contributed a paper on "Induced mutations and the viability problem." Data were given on certain mutants induced by X-ray treatment of barley.
A. Câmara, in an address on "Possible contributions to plant improvement," outlined plant breeding work in Portugal, which includes artificial induction of mutations and polyploids, and study of caryological interrelationships of the species in wheat and other plants and the significance of polysomics.
Å. Åkerman described the history, organization and achievements of the Swedish Seed Association at Svalöf.
O. Gasparini discussed problems in connexion with seed production in Italy.
V. Boceta described results obtained in Spain with maize hybrids produced by crossing plants selected from consanguineous lines, a method which produces improvements in less time than that required for the selection of inbreds.
A. Dionigi reported on the work of the Nazareno Strampelli Cereal Research Station at Rieti. Promising results are obtained by subjecting segregating progenies to cold chamber treatment before testing under field conditions.
G. W. Adriance spoke on "Fruit breeding problems in Texas," with special reference to the production of peaches with a low degree of cold requirement, capable of giving fruit in Texas. Mention was also made of work with raspberries, figs and grapefruit.
C. Oppenheimer discussed fruit breeding problems in Israel, referring to the difficulty of growing apples, which suffer damage to the blossom through lack of shade during the very hot days of early spring when the trees are still leafless. Å. Gustafsson recommended X-irradiation of European types to induce bud mutations which might include precocious leafing types.
A. Morettini outlined achievements in fruit breeding work in Italy.

M. Marinucci examined problems of olive breeding in Italy. In the subsequent discussion R. Ciferri gave his views on the evolution of the cultivated olive, suggesting that this has taken place by introgressive hybridization.
G. Dalmasso outlined the history of vine breeding in Italy. He expressed the view that it may be profitable at this stage to reexamine the German method of approach, i.e. using the direct producer hybrid.
F. Marschall contributed a paper on "Plant-sociological considerations regarding alpine pastures."
T. J. Jenkin, speaking on "Genetic problems in breeding forage grasses," described the work of the Welsh Plant Breeding Station.
A paper entitled "Problems of forage plant selection in relation to the fertility potentialities of the soil" was given by G. Haussman. Special emphasis was laid on the capacity of different plants to influence the soil structure, owing largely to differences in the type of root system.
M. Mendizábal described the work of the agricultural experiment station for arid zones at Almeria.
F. D'Amato gave an account of experiments in which Gammexane was shown to have certain advantages over colchicine as a polyploidizing agent, especially in respect of its low toxicity.
T. Castelli outlined Winge's work on the genetics of yeast, and reported some observations of his own in which close correlation between spore form and fermentative capacities was demonstrated.
At the final session, held at the Pontifical Academy of Sciences in the Vatican City, R. Esteruelas reported on the work of the Aula Dei Agricultural Experiment Station near Zaragoza. R. Téllez referred to difficulties in the classification of agricultural varieties of wheat according to present systems of classification of species and varieties; his proposal that a meeting of geneticists and plant breeders interested in the problem should be organized at the next International Genetics Congress in Rome was unanimously adopted.
One of the evening sessions was devoted to a visit to the projected Apennine Research Centre, intended for general biological studies in taxonomy, cytology and other fields.

166.
Tutelare gli inventori delle nuove razze vegetali. (**Protect the inventors of new plant varieties**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1949 : **33** : p. 107.

A national association has been founded in Italy for studying the means whereby some form of protection for the products of plant breeders can be attained. The association is known as the Sindacato Nazionale Costitutori and has its headquarters at Bologna.

167.
Assemblea del Sindacato Costitutori. (**Meeting of the Breeders' Association**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1950 : **34** : p. 107.

The first meeting of the association (cf. Abst. 166) was held in June 1950. The Italian ministry of agriculture and forests is at present working on a patent law for horticultural plant varieties.

168. Peto, H. B.
Ship me another car of hybrid seed!
Sth. Seedsman 1950 : **13** : No. 10 : 16, 42, 46 and 63.

An account of the increasing commercial use of F_1 hybrid tomatoes, cucumbers and water melons in the USA is given. An F_1 hybrid sunflower variety is being tested in Ventura County, California, which possesses the valuable characters of short stalk and has

suitability for combine harvesting, high yielding capacity even on unirrigated land, and high oil, protein and vitamin contents.

169. Topčiev, A. V.
(Progress report of the scientific research programme of the USSR Academy of Sciences for the year 1948).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 7 : 76–84.

In biology, constant cooperation between theory and practice became the principal method for showing up Weismannite fallacies and for the development of Mičurinite science. The study of vegetative hybridization showed that the characters acquired by organisms as a result of their environment must be heritable. The experiments on changing hard wheats into soft wheats showed how species arise and how one wheat species can be obtained from another. The need for the ideological struggle against bourgeois reactionary theories in all branches of science including biology is stressed.

170. Harlan, J. R.
Collection of crop plants in Turkey, 1948.
Agron. J. 1950 : **42** : 258–59.

An exploration of Turkey conducted in 1948 by the author for the USDA Division of Plant Exploration and Industry resulted in a collection of cereals, forage and other plants, including some wild forms. Of particular interest is the collection of Turkish wheats.

171. Boerger, A.
Immunitätsgenetik und Resistenzzüchtung landwirtschaftlicher Kulturpflanzen im La Plata-Gebiet. (**Immunity genetics and resistance breeding of agricultural crop plants in the La Plata region**).
Z. Pflanzenz. 1950 : **29** : 6–34.

This general survey, based on an extensive bibliography, deals with the genetics of immunity and breeding for resistance in agricultural crop plants to insect pests and plant diseases, including fungi, in the La Plata region of Argentina, Rio Grande do Sul and Uruguay. The crops dealt with include wheat, maize, oats, barley, flax, sugar cane, lucerne and potatoes.

172. Hunter, A. W. S. and
White, F. H.
Breeding for disease-resistance in Canada. Part III. Horticultural crops and tobacco.
Emp. J. Exp. Agric. 1950 : **18** : 218–26.

A review is presented of work in Canada on breeding for disease resistance in potatoes, tomatoes, peas, apples, pears, strawberries, raspberries, currants, tobacco, beet, beans and American elms.

173. Chaugule, B. A.
Drought resistance in plants.
Poona Agric. Coll. Mag. 1950 : **41** : 5–19.

Literature on the nature of drought resistance is critically examined according to the following aspects: nature of drought resistance and the factors responsible; critical periods

of the plant in relation to drought; the physiological basis of critical periods; technique of studying atmospheric drought resistance, including the use of machines; technique of studying resistance to soil drought; and analysis of the problem of drought resistance in relation to selection. True drought resistance depends upon protoplasmic properties. It is emphasized that the capacity of the protoplasm to endure water loss may completely mask the significance of relevant anatomical features and other physiological characteristics besides the protoplasmic properties; investigators endeavouring to establish strict correlation between drought resistance and external characters may therefore be misled.

174.

Field experiments, 1948.
J. Dep. Agric. Éire 1949 : **46** : 131–48.

Among the experiments conducted by the county agricultural instructors in 1948 were variety trials of spring wheat, barley and potatoes. Comparison of the spring wheats Atle and Progress continued. The average grain yield of Progress was significantly higher at the 1% level than that of Atle. Barley varieties tested comprised Ymer, Freja, Camton, Kenia and Kenia x Spratt-Archer x Kenia 6/3 No. 5. Trials were undertaken at 64 centres to compare the potatoes Ulster Commerce, Stormont Dawn and Kerr's Pink.

175.

Seeds. Report of the Committee on Qualitative Control of Seeds.
Minist. Agric., Lond. 1950 : Pp. 31.

The testing of new varieties of crop plants is discussed. The danger of using new varieties before they have been adequately tested is pointed out, and it is recommended that in the case of cereals new varieties should be submitted for testing for at least two years before being offered for sale. The maintenance of varietal purity is also discussed.

176. Shulkcum, E. *ET AL.*
1949 Varietal tests. High crop yields with adapted varieties.
Bull. Va. Agric. Exp. Sta. 1950 : No. 432 : Pp. 32.

Varietal trials of maize hybrids, wheat, oats, barley, tobacco, groundnut and soya bean in Virginia are reported.

CEREALS

177. Smith, L.
Effects of atomic bomb radiations and X-rays on seeds of cereals.
J. Hered. 1950 : **41** : 125–30.

The effects of radiations from the first explosion of the bomb detonated at Bikini, July 1946, and of known dosages of X-rays upon dormant seeds of barley, *Triticum durum* and *T. vulgare*, were investigated. Limited macroscopic observations were also made on plants grown from seeds of oats exposed to radiation from the atomic explosion. The effects studied included: germination; flecking or mottling on the first leaves; chimeras; interchanges in the X_1 plants grown from the irradiated seeds; frequencies of seedling mutants in the X_2; and types of mutants occurring in the X_2. Seeds most severely irradiated during the atomic explosion received a dose of irradiation approximately equivalent to 16,000 r. of X-rays. The seedling mutants produced by exposure to both sources of irradiation showed no striking differences. In most cases the mutants were monofactorially determined.

The frequency of bomb induced mutants obtained from 19-year-old seeds of the barley Moister and from one-year-old seeds of the barley Trebi was 15 times as high as the frequency of spontaneous mutations.

178. VALLE, O.
Specifika drag för finsk växtodling. (**Special features in Finnish crop production**).
Nord. JordbrForskn. 1949–50 : No. 2 : 156–61.

An account is given of the varieties of rye, spring wheat, barley, oats, potatoes and root crops, bred and grown in Finland.
A new spring wheat Apu [Help], bred at Jokioinen, is being multiplied; it is 11–12 days earlier than Diamant [Diamond] and is intended for central and northern Österbotten.
The root crops in northern Finland include the so-called AIV turnip (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1719).

179. VUORINEN, J.
Lantbrukets försöks- och forsknings- verksamhet i Finland. (**Agricultural experimentation and research in Finland**).
Nord. JordbrForskn. 1949–50 : No. 2 : 109–22.

The government institutions and private concerns engaged in agricultural research in Finland are described, with information about the staff and a map showing the location of the various research centres and a list of scientific publications.
One section deals with the institute at Jokioinen where new varieties of cereals, peas and pasture grasses have been produced.

180. VALE, M. M. do.
O melhoramento de plantas em Angola. (**Plant breeding in Angola**).
Agron. Angol. 1950 : No. 3 : 17–25.

A short account is given of the history of plant breeding in Angola, and the initial work that has been done on the improvement of wheat, barley, oats and maize is described.

181. FELDMANN, C.
Wie entsteht eine neue Getreidesorte? (**How is a new cereal variety produced**?)
Schweiz. Landw. Z. 1950 : **78** : 631–36.

This account, intended for Swiss farmers, describes the process of breeding new varieties of cereals. The geographical centres of origin of the various cereals and the importance of land varieties are dealt with and a description of modern plant breeding technique follows, including progeny testing, hybridization and selection, with special mention of the Ramsch method.

182. FORLANI, R.
Ibridazioni interspecifiche e intergeneriche di Graminacee. (**Interspecific and intergeneric crosses of Gramineae**).
Ann. Sper. Agrar. Roma 1950 : **4** : 537–60.

The results, as regards facility of hybridization, obtained by the author during 1933–39 and by previous investigators, are recorded for the following types of crosses, which are

arranged in descending order of affinity: between wheat species belonging to the same chromosome group; between hexaploid and tetraploid wheats; between hexaploid wheats and *Secale cereale*; between hexaploid and tetraploid wheats, each crossed with *Aegilops ovata*; between tetraploid and diploid (*T. monococcum*) wheats; between hexaploid and diploid (*T. monococcum*) wheats; between tetraploid wheats and *S. cereale*; between diploid wheats (*T. monococcum*) and *Ae. ovata*; between *Ae. ovata* and *S. cereale*; between diploid wheats (*T. monococcum*) and *S. cereale*; and between *Triticum* and *Agropyron*. The number of pollinations carried out, the set obtained and the fertility of any resulting plants are reported. In general, when the species were closely enough related, e.g., hexaploid x tetraploid wheats, crossing was relatively easy and the offspring fertile in various degrees. On the other hand, with distantly related species, e.g. hexaploid or tetraploid wheats x *T. monococcum* or *Aegilops*, or *Aegilops* x rye, hybridization was difficult and the offspring sterile, though in some cases back-crossing resulted in the formation of a few grains.
The induction of polyploidy by various agencies and the possibility that it may occasionally occur naturally in the F_1 from crosses of distantly related forms are mentioned with reference to the role of artificial induction of polyploids in plant improvement.

183. Brücher, H.
En ny biokemisk snabbmetod för bestämning av grobarhet hos spannmål. (**A new rapid biochemical method of determining germination capacity in cereals**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 210–14.

Having considered the value of methods hitherto used to determine germination capacity in cereals, the writer describes the new test which is based on his observation that peroxidase activity in cereals, including maize, is positively correlated with germination capacity. Where this capacity has been reduced or eliminated by ageing, excessive moisture or heat, a corresponding reduction in activity of the enzyme occurs. In kernels treated with benzidene or guaiacol the intensity of the colour developed indicates the peroxidase activity and hence the germination capacity of the grain.

184. Manunta, C.
Pigmenti carotenoidi delle cariossidi in varie razze di orzo, segale e avena. (**Carotenoid pigments of the caryopses of different varieties of barley, rye and oats**).
Genetica Agraria, Roma 1948 : **1** : 360–65.

The results are given of analyses of the carotene and lutein content of 26 varieties of barley, five varieties of rye, and three varieties of oats. The barleys included some varieties from Tibet, and the ryes Polish and Russian varieties.

185. Kostoff, D. *et al*
Untersuchungen über die Aleuronschicht (Vorläufige Mitteilung). [**Studies on the aleurone layer. (Preliminary communication)**].
Z. Pflanzenz 1950 : **29** : 107–09.

In this research a series of cultivated and wild genera, species and varieties were examined, including 52 wheats, 14 ryes, 32 barleys, 48 oats, 16 maizes, 27 grasses, 7 sorghums and 6 millets, as well as a variety of amphidiploid hybrid forms.
In all the species studied, the aleurone layer was found to be thicker in cultivated than in wild, or primitive cultivated forms. The ratio of the volume of the aleurone layer to that

of the whole grain was generally greater in wild plants than in cultivated, since the grains of the latter are larger. Aleurone granules not only fill the cells of the aleurone layer, but are also found in the endosperm cells to an extent depending on the variety, species and environment; endosperm cells containing aleurone granules are more frequently seen in wild plants.
In the genera and species investigated, a multicellular aleurone layer was found in all the cultivated barleys and in *Hordeum spontaneum* and *H. bulbosum*; the other wild species of barley show only unicellular layers. This result throws further light on the relationship between *H. spontaneum* and cultivated varieties and on its origin and that of *H. bulbosum*. If the grain furrow and the content of aleurone granules in the endosperm cells are also taken into account, then the aleurone layer is a criterion which could be used in breeding for high protein content.
The proportion of the aleurone layer in the grain of maize may not be used to judge protein content in the grains, since the embryo is relatively large and, moreover, contains relatively large amounts of oil and proteins. Hence in breeding maize the proportion of the grain occupied by the embryo must be taken into consideration and it seems that this will be found necessary too for wheat and the other cereals.

186. Moldenhawer, K.
Główniejsze zboża występujące w wykopaliskach Biskupina (Wielkopolska). [**The principal cereals occurring in finds at Biskupin (Wielkopolska)**].
Rocz. Nauk Rol. 1949 : **51** : 306–12.

Cereal grains, from the early iron age, found at Biskupin, were identified as *Triticum vulgare*, *T. compactum*, *T. dicoccum*, *T. Spelta* and a multi-rowed barley. The probable origin suggested for *T. Spelta* is a natural cross between *T. vulgare* and *T. dicoccum*.

187. Lebedev, D. V.
(Russian varieties of agricultural plants in Canada).
Priroda (Nature) 1949 : No. 5 : 56–57.

This Russian article is based on the original paper, in English, by E. Stark, which has already been reviewed in *Plant Breeding Abstracts*, Vol. XIX, Abst. 872.

188. Ikemura, Y.
(On differences in the development of cereal varieties according to the date of sowing).
Proc. Crop Sci. Soc. Japan 1944 : **15** : 255–62.

Information is presented on the earing date, maturation date, length of straw, size of ears, length of awn and other agronomic data of a large number of Japanese barley and wheat varieties, each sown on three different dates.

189. Hunter, H.
Variations in some hybrid varieties of cereals.
J. Inst. Corn and Agric. Merchants 1950 : **2** : 186–99.

Variations in hybrid cereal varieties are discussed, with particular reference to variations in morphological and other characters observed in the barley Spratt-Archer and segregates of the oat hybrid Argentine x Grey Winter. The problem of maintaining hybrid wheats in

a pure condition is examined in the light of data on the variations which may occur. Some discussion is given of the value of Scandinavian barleys for the British Isles.

190. KADAM, B. S.
Increasing yields of crops by breeding. I. Cereals.
Indian J. Genet. Pl. Breed. 1949 : **9** : 72–82.

A brief survey is presented of the breeding, in India, of improved types of rice, wheat, jowar, bajra, ragi (*Eleusine coracana*), barley and maize, and their yielding capacity. Increases in the yields of cereals which have been achieved by means of breeding work in the USA and Japan are also referred to. It is concluded that in India the potentialities of improved strains have not been extensively utilized.

191. CAUDERON, A.
La défense génétique des cultures. L'utilisation des variétés résistantes aux anomalies climatiques et aux parasites. (**Genetical protection of crops. The use of varieties resistant to anomalies of climate and to parasites**).
Bull. Techn. Inform. Ingén. Serv. Agric. 1950 : No. 49 : 291–300.

A general review is given of: the role of environmental and hereditary factors in adaptation; types of resistance; aims and methods of selection with special reference to indigenous populations in France; climatic factors; and plant and animal parasites.
New varieties should not be released unless superior to existing ones and their value should be thoroughly tested by extensive regional trials. The production of resistant varieties of various crops for use in breeding new forms has been begun in France.

192.
(**The study of drought resistance in plants**).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 6 : 125–26.

A study of biological methods of increasing resistance to drought in wheat, maize, forage plants and sunflower is included in the programme of an expedition sent by the USSR Academy of Sciences to the arid black earth zone of European Russia to investigate the problems of the complex rotational system.

193. MCKINNEY, H. H.
Infectious and non-infectious pigment disorders in the small grains, with particular reference to the south-eastern area.
Plant Dis. Reporter 1950 : **34** : 151–54.

Observations on pigment disorders and the results of inoculation tests carried out in the attempt to discover the causes of these disorders are reported. It is emphasized that the whole problem of abnormal pigment conditions in cereals, which may be due to virus infection or non-parasitic causes, requires elucidation. A full understanding will depend upon more complete knowledge of genetic, edaphic, ecological, enzymatic and nutritional factors. Observations indicate that by selection under appropriate conditions the genotypes which frequently express the more extreme disorders in pigment production can be eliminated. It is however questionable whether genotypes showing lesser degrees of pigment disorder on the marginal lands and only occasionally should be discarded only on account of these disorders.

194. BALDACCI, E. and
FORLANI, R.
Ricerche su varie razze di cereali, spontanei e coltivati, in relazione ad attacchi di *Claviceps purpurea.* (**Research on different races of wild and cultivated cereals in relation to attacks by *C. purpurea*).**
Genetica Agraria, Roma 1948 : **2** : 73–84.

Infection tests of three cultures S, T and A of *Claviceps* isolated from *Secale cereale, Agropyron* species, and hybrids of *Triticum* with *Agropyron* have shown that S, A and T all belong to *C. purpurea,* though their exact relation to the strains isolated by Stäger and by Mastenbroek and Oort could not be determined. The strain is designated P_5 in accordance with Barger's nomenclature.
Another problem investigated was the immunity of naturally sterile wheat hybrids to infection by *C. purpurea,* as exhibited in the F_1 of Cappelli x *Aegilops ovata,* spelt x *Ae. ovata,* M. Calmo [Mont Calme] x *Ae. ovata, T. turgidum* x *T. monococcum* and of (Lutescens 062 x *Agropyron glaucum*) x *T. monococcum.* Possibly the immunity of plants that are female sterile may be due to a growth hormone deficiency, inhibiting both the germination of the pollen and the development of sclerotia of *Claviceps.*

195. AUFSESS, A.
Ein Beitrag zur Schwarzrostforschung in Österreich. (**A contribution to research on black stem rust in Austria**).
Bodenkultur, Wien 1950 : **4** : 186–203.

In reviewing research on *Puccinia graminis* in Austria, the author records the results of various workers and of his own experiments from 1941 to 1946 at the Institute of Agronomy and Crop Production at Admont, with special reference to the following problems: the origin of a black stem rust epidemic in Austria; climatic influences; causes of infection; varietal resistance in cereals and damage due to the fungus; black stem rust on grasses; and the control of the pathogen.

196. DERSCHEID, L. A.
Some of the effects of 2,4-D on spring wheat, oats and barley.
Proc. 5th Annu. N. Cent. Weed Control Conf. Springfield, Illinois, 1948 : Dec. 8–10 : 21–26 : (Mimeographed).

A review is given of the results of experiments on the effects of 2,4-D upon varieties of spring wheat, oats, and barley, treated at several localities in Canada and the USA and at several stages of growth.

197. OLSON, P. J.
Effects of 2,4-D on spring planted small grains.
Proc. 6th Annu. N. Cent. Weed Control Conf. Sioux Falls, S. Dakota 1949 : Dec. 6–8 : 67–68.

The results of experiments carried out in Canada and the USA to determine the effects of 2,4-D on yield, morphological characters and quality in spring wheat, oats and barley are surveyed. The investigations included studies of the effects of 2,4-D at different stages of growth, different formulation, different rates of application and differential response of varieties.

198. Christensen, A.
På strejftog gennem årets planteavlsberetninger. (**A ramble through the year's reports on plant cultivation**).
Tidsskr. Landøkon. 1950 : **4** : 189–201.

The reports of the Provincial Committees for Plant Cultivation of the Agricultural and Smallholders' Associations in Denmark have provided the material for this survey of results based on about 3500 local field experiments throughout the country.
The trials of varieties and strains are carried out largely under the direction of the Committee on Varieties and Strains, but also, in many cases, by the Provincial Committees for Plant Cultivation or by the local plant cultivation committees of the Agricultural and Smallholders' Associations.
Some selected results from trials of wheat, oats, rye, barleys, lucerne, clover and potatoes for fodder and for industrial use are briefly mentioned.

199. Åkerman, Å.
Bedömning av stråsädessorters odlingsvärde med ledning av jämförande försök. (**Determination of the agricultural value of varieties of cereals in the light of comparative trials**).
Lantbruksveckan 1950 : 258–67.

In this lecture the history of the development and organization of variety testing in Sweden is outlined, with a detailed discussion of numerous modifications that might be adopted in variety testing in that country in order to attain greater accuracy in the results.

WHEAT

200.
Varieties of winter wheat.
Fmrs.' Leafl. Nat. Inst. Agric. Bot., Cambridge 1950 : No. 8 : Pp. 4.

Winter wheat varieties recommended for growing in England for breadmaking or biscuit manufacture are described. A supplementary list of recommendations based upon recent trials comprises the varieties Staring, Nord Desprez, Hybrid 46 and Pilot.

201. Clark, J. A.
Registration of improved wheat varieties, XVIII.
Agron. J. 1950 : **42** : 408–09.

Descriptions are given of the following wheats recently registered under a cooperative agreement between the US Bureau of Plant Industry, US Department of Agriculture and the American Society of Agronomy: Blackhawk, Austin, Cadet, Saunders and Cascade.

202. Clydesdale, C. S. and
Miles, L. G.
Wheat growing in Queensland.
Qd. Agric. J. 1950 : **70** : 311–37.

Descriptions and illustrations of the more important wheat varieties grown in Queensland are included. The majority of these varieties are either widely used or recommended at the present time; a few have been considered for reasons of historical interest.

203. Triulzi, G. A.
Grani primaverili sperimentati in Val di Susa a 1865 m.s.l.m. (**Experiments on spring wheats in the Val di Susa at 1865 metres above sea level**).
Ann. Sper. Agrar., Roma 1950 : **4** : 383–91.

The alpine experiment station at Salice d'Ulzio in the Val di Susa at an altitude of 1865 m. has been making experiments on spring cereals that might take the place of winter rye, which occupies the ground for a full year, and in 1949 tested five Swedish wheats from Svalöf and three Italian varieties. The first variety to mature was Mentana; the highest yields were given by the Swedish varieties, especially Diamant and Progress, with over 38 q. per ha. The Italian variety M33 showed a particularly favourable combination of earliness and yielding ability.
Observations on plant development showed that tillering was reduced at the high altitude and that vegetative vigour was the most important attribute to select for in mountain wheats.

204. Calzada Benza, J.
Los híbridos de trigo producidos por el C.R.I.E.A. del Centro (Huancayo) están dando excelentes resultados. [**The wheat hybrids produced by the CRIEA for the Centre (Huancayo) are giving excellent results**].
Agronomía, Lima 1949 : **14** : 93–95.

Thirty-two wheat varieties, including a member of hybrids produced by the Centro Regional de Investigación y Experimentación Agrícola del Centro [Regional Agricultural Research and Experimental Centre for the Centre] were tested at Concepción, in the Mantaro area of Peru, in 1947 and the 22 best again in 1948. Each year the highest yields were given by hybrids produced at the Centre, the best of which exceed the local standard varieties by almost 1000 kg. per ha. They are now being introduced into extensive cultivation. The characters required in a successful wheat in the high altitudes of Peru are resistance to frost, drought, *Puccinia glumarum* and *P. Tritici*.

205. Peglion, V.
Forlì, culla della neogranicoltura. (**Forlì, the cradle of the new wheat growing**).
Ital. Agric. 1950 : **87** : 333–40.

The author reviews in retrospect the changes in wheat cultivation that have accrued in the Forlì province of Italy in the last 70 years. He mentions the introduction of the new and improved varieties produced first by Todaro and later by Strampelli. Some of the early varieties such as Ardito led to disappointments because their growth rhythm was not always in harmony with that of the climatic conditions of the localities in which they were grown. Their earlier maturity, however, enabled them to escape the attack of rust and the effects of summer drought, and their lower stature to tolerate larger dressings of fertilizers. The impression that the short varieties had a reduced tillering capacity was not justified.

206.
Report of the Fifth Western Wheat Conference.
U.S. Dep. Agric., Bur. Pl. Ind., Soils Agric. Engineering, Div. Cereal Crops and Diseases, Washington 1950 : Pp. 88. (Mimeographed).

Buchanan, M. T. *Brief history of the Western Wheat Quality Laboratory.* (*pp.* 5–7).

The chief purposes of the Western Wheat Quality Laboratory recently set up at Pullman, Wash., are to cooperate with plant breeders in evaluating the milling and baking

characteristics of selections and to assist in further identifying the characteristics associated with good bread, pastry and other products.

Haley, W. L. — *The need for improved milling and baking qualities of western wheats.* (*pp. 7–12*).

The opinions of 11 flour mill chemists regarding the rating of wheat varieties grown in western USA with respect to milling and baking quality are indicated.

Bayles, B. B. — *Research at the Regional Wheat Quality Laboratories.* (*pp. 12–23*).

Factors influencing wheat quality, and the relationship between various characteristics as shown in quality tests are discussed. It is postulated that the screening of breeding material in some crosses can be started as soon as the F_3 to F_5 generation. For example, in crosses between hard and soft varieties lines with low pearling index or particle size could be discarded if a soft wheat is the objective. Then the satisfactory lines could be subjected to the mixograph within a year or two and those with suitable mixograph areas subjected in turn to the "cookie test." Thus the length of time that undesirable strains are maintained in the breeding nurseries could be reduced.

Barmore, M. A. — *Progress and accomplishments of the Western Wheat Quality Laboratory to date.* (*p. 24*).

The characterization and evaluation of new varieties have been in progress since 1948. The various tests used are enumerated. In the summer of 1948, 103 advanced selections were tested.

Seeborg, E. F. — *The Buhler mill as an instrument for variety selection.* (*p. 25*).

Data obtained by means of the Buhler mill are adequate for the prediction of commercial milling behaviour and therefore for the selection of strains on the basis of milling performance.

Sundberg, D. F. — *Cookie and cake baking methods used to characterize varieties.* (*p. 25*).

The methods used are briefly described.

Nichols, M. B. — *Use of mixograph in determining flour characteristics.* (*p. 26*).

The use of dough mixer curves for determining the gluten strength and other characteristics of flour is discussed.

Butler, R. J. — *Variety characterization by pearling, particle size and viscosity.* (*p. 26–27*).

The significance of pearling, particle size and viscosity tests is explained.

Barmore, M. A. — *Tentative plans for future variety characterization and research.* (*pp. 27–28*).

Investigations on quality testing which are in progress at the Western Wheat Quality Laboratory are listed.

St. John, J. L. — *Essential chemical research in the western wheat quality program.* (*pp. 28–32*).

Studies in wheat chemistry are discussed in relation to the needs of the Pacific Northwest and a survey is included of some of the papers which have recently appeared in the journal *Cereal Chemistry*.

Suneson, C. A. — *Wheat improvement in California.* (*pp. 36–39*).

Progress and policy in wheat breeding in California are described. All varieties released by the California Experiment Station since 1937 have been developed by back-crossing. Stress is laid on the improvement of established varieties. Varieties accounting for 85% of California's wheat production now possess resistance to both bunt and rust.

Pope, W. K. — *Wheat breeding in Idaho.* (*pp. 39–40*).

A summary is given of wheat breeding work in progress in Idaho and plans and recommendations for the future are outlined.

Hehn, E. R. — *The winter wheat breeding program in Montana.* (*pp. 41–42*).

Yield is the major criterion of selection under conditions in Montana. The results of tests are discussed in connexion with the fact that no new superior varieties have been produced since 1932; and future possibilities are considered.

McNeal, F. H. — *Cooperative spring wheat improvement work in Montana.* (*pp. 43–45*).

The testing and breeding work in progress are discussed. Important objectives in spring wheat breeding are high yield, heavy test weight and resistance to shattering, lodging and sawfly. Some 4700 introduced and domestic wheats are being screened for sawfly resistance.

Woodward, R. W. — *Wheat improvement work in Utah.* (*pp. 45–46*).

Breeding objectives and the work in progress are outlined. Protein content and resistance to bunt and smut are important. Spring wheat breeding is centred round Lemhi and Federation as good yielding but disease susceptible parents, and resistance to rusts and smuts is being added through derivatives of Hope and Kenya.

Foote, W. H. — *Wheat improvement program in Oregon.* (*pp. 46–47*).

The programme is divided into two separate parts covering the Columbia basin and the other wheat growing areas of the state. Outside the Columbia Basin varietal tests are carried out. At Corvallis special attention is being paid to yielding ability, straw strength and disease resistance. At Klamath Falls the selection of a high yielding, rust resistant spring wheat to replace Marquis and of a strong strawed, high yielding winter variety to replace Turkey and Galgales in irrigated areas is an important objective.

Martin, J. F. — *Wheat breeding and agronomy in the Columbia Basin area of Oregon.* (*pp. 47–49*).

Several promising hybrid selections are mentioned. All have white kernels and have been or will be crossed with Elgin and later with other types to obtain additional bunt resistance and improved quality for pastry purposes.
A genetic study of resistance to race T–16 of bunt is to be started in 1950. Tests indicate that with the exception of varieties having the Ridit type of resistance, wheat varieties resistant to this race also carry resistance to dwarf smut.
The tillering of varieties and varietal response to nitrogen fertilizer are to be studied.
By using lighting and refrigeration to break dormancy it is hoped to obtain two hybrid generations per year to speed up the breeding programme.
Cold resistance is to be studied, and testing of cereal varieties from other stations is to be continued.

Swenson, S. P. — *Objectives of wheat improvement in Washington.* (*pp. 49–58*).

The characteristics required in new varieties are pointed out, and some details are given of varieties grown in the five wheat producing areas of the state. The objectives of the breeding work, the progress being made and the methods employed are indicated. The back cross technique and pedigree selection are used.
Genetical and cytogenetical studies and interspecific hybrids receive attention, including studies on *Triticum monococcum*, the genetics of disease reaction, and the transference of important characters from other species and varieties into common wheats.
The projects are organized into six classes: varietal testing, winter wheat breeding, spring wheat breeding for dry land conditions, spring wheat breeding for sub-humid areas, the transference of economic characters from other species and genera, and genetical and cytogenetical studies.

Suneson, C. A. — *Survival of barley varieties in mixtures.* (*p. 59*).

The text of this paper is not included as it has already been published elsewhere (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 952).

Vogel, O. A. — *The need for a tough rachis in new wheats for the Pacific Northwest.* (*pp. 59–62*).

A certain degree of toughness of the rachis is necessary for satisfactory threshing and many wheats possessing resistance to shattering have proved deficient in this respect. Tests at Pullman showed that Koelz 5865 and Koelz 5894 from Iran had the toughest rachis of all the varieties examined. Norin 10 from Japan was also interesting. Methods of testing for threshing quality are discussed.

Holton, C. S. — *Regional smut investigations in relation to wheat improvement.* (*pp. 62–66*).

Studies of the biological races of bunt in the Pacific Northwest and of the reaction to them of varieties and selections of wheat are described. At present five major types of bunt resistance, the Martin, Turkey, Ridit, Brevor and Hohenheimer types, are recognized. For determining dwarf bunt reaction two bunt races which are virtually identical with dwarf bunt in their pathogenicity are now used.

Briggs, F. N. and Holton, C. S. — *Reaction of wheat varieties with known genes for resistance to bunt.* (*p. 66*).

The data have been submitted for publication elsewhere and are not given in full. The reactions to 25 bunt races of 12 wheat varieties for which the resistance genes were determined have been studied; it is concluded that the Martin and either the Turkey or the Rio gene together give resistance to all the 25 races.

Sprague, R. — *Varietal resistance of wheats to rootrot.* (*pp. 67–68*).

Notes are presented on varietal reaction to straw breaking foot rot (*Cercosporella*), common root rot (*Helminthosporium sativum* and *Fusarium culmorum*), crown rot, spot blotch (*H. sativum*), take-all (*Ophiobolus*), *Pythium* blights, snow moulds (*Typhula* spp. and *F. nivale*), and eyespot (strains of *Rhizoctonia Solani*).
Work with wide crosses is thought to be promising as regards disease resistance.

Elliott, F. C. — *Sources of resistance to leaf and stem rusts.* (*pp. 69–72*).

The breakdown of the leaf and stem rust resistance of wheat varieties owing to the occurrence of new biotypes of the pathogens is discussed. Results of leaf and stem rust

resistance tests carried out at different experiment stations in 1948 are presented and the use of interspecific and intergeneric hybrids for obtaining rust resistance is discussed. Lists are included of hybrids and varieties which provide sources of resistance to the prevalent races of one or both kinds of rusts.

Unrau, J. — *The use of nullisomics and monosomics in cytogenetic studies of common wheat.* (*pp. 73–79*).

The results discussed in this paper have already been referred to in *Plant Breeding Abstracts*, (cf. Vol. XX, Abst. 2238).

Allard, R. W. and Shands, R. G. — *The transfer of resistance to stem and leaf rusts, mildew and loose smut from* Triticum Timopheevi *to cytologically stable spring wheats.* (*pp. 80–81*).

The strains CI12632 and 12633 are described. They were derived from the hybrid between an unnamed hard red spring wheat with *Triticum Timopheevi* PI94761, back-crossed twice to the former. Selfing was carried out for eight generations, the segregants being selected for stem and leaf rust resistance and desirable agronomic characters, particularly early maturity and ease of threshing.

Tests over several years have shown that CI12632 and 12633 have a high degree of mature plant resistance to stem and leaf rusts and to mildew. CI12633 has also shown resistance to 10 of the 11 known races of loose smut and is only slightly infected by the eleventh.

Results of crosses with Reward are reported which show that stem rust resistance in the two selections depends on two dominant, linked genes showing 23·7% crossing-over in hybrids derived from CI12632 and 16·9% in hybrids derived from CI12633. These results were obtained at Madison, Wisc. At Davis, Calif., where only race 17 of stem rust was present, an F_3 ratio of approximately one resistant to three susceptible plants was obtained, indicating one dominant and one recessive gene with approximately 20% crossing-over. The different results are most simply explained on the basis of differential reaction to races of rust. Resistance to mildew appears to be closely linked with stem rust resistance.

Preliminary data on the inheritance of leaf rust resistance in these strains indicate that this character is recessive and appears to be simply inherited. There has been no difficulty in obtaining highly resistant plants in the F_2, and lines homozygous for resistance in the F_3 and F_4.

Both selections have earlier maturity and higher yield than Hope at both Madison and Davis, their greatest fault being weak glumes which allow severe shattering under conditions of low humidity. They are considered at least as good as Hope agronomically. They have regular meiosis and their hybrids with common wheat have somewhat more regular meiosis than hybrids of Hope.

Pope, W. K. — *Comparative cytology of colchicine-induced and open pollinated derivatives of hybrids of* Agropyron trichophorum *with* Triticum durum, T. Timopheevi, *and* T. macha. (*p. 82*).

Amphidiploids of the hybrids between *Agropyron* and *Triticum* were readily obtained with colchicine and were morphologically very similar to the diploids. They had the expected 4*n* chromosome number but pairing was only occasionally complete, varying in most cases from 83·4% to 94·6%. The progeny of the amphidiploid F_1 plants usually showed a decrease in the number of synapsed chromosomes and a variable total chromosome number. Fertility was positively correlated in some cases with number of bivalents and total number of synapsed chromosomes but showed no correlation with total chromosome number. Failure of complete pairing in the amphidiploids was attributed to physiological disturbances caused by interaction between genes of *Triticum* and those of *Agropyron* controlling the same cell processes.

Both controlled and open-pollinated outcrosses with the F_1 hybrids were obtained, including triple hybrids with *A. elongatum*. Some outcrosses had 50% univalents and multiple associations of 3, 4 and 5 chromosomes. In all but two cases the functional

megaspore was either reduced or nearly reduced. Outcrosses to related advanced generation *Triticum* x *Agropyron* hybrids with high chromosome numbers gave the most desirable agronomic types.

Vogel, O. A. *The establishment of a uniform hard red winter wheat nursery for the western region.* (*p. 86*).

Plans concerning cooperative testing of hybrids and varieties for growing in the Western region of the USA are outlined.

207. Torssell, R. and
Åkerberg, E.
Svalöfs Odinvete, 01392. Ny höstvetesort för mellersta Sverige. (**The Svalöf wheat Odin, 01392. A new autumn wheat variety for central Sweden**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 190–207.

This new wheat put on the Swedish market in 1949 was bred at the Ultuna Branch Station of the Swedish Seed Association from the cross Ergo x Gluten (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 633 and Vol. XX, Abst. 651). In earliness and hardiness Odin is intermediate between the parents, while in yield and strength of straw it exhibits transgressive improvement. In grain quality and baking value Odin equals its competitors. In addition to detailed information on the qualities and performance of the new variety, information is given on autumn wheat breeding work at the Ultuna Station (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 888).

208. Dionigi, A.
Un notevole caso di "disgiunzione trasgressiva" il frumento C.G.47. (**A remarkable case of "transgressive segregation," the wheat C.G.47**).
Genetica Agraria, Roma 1948 : **1** : 326–29.

In tests under different conditions in the greenhouse and in the field, a new line of wheat CG 47 from a cross of Florence SA by the extremely early M 33 has far surpassed both the parents and their reciprocal F_1 hybrids in earliness. Such an advance suggests that wheats yielding several harvests per annum may not be impossible.

209. Åkerman, Å.
Råproteinhalt och bakningsegenskaper hos Svalöfs Odinvete. (**Crude protein content and baking quality of the Svalöf wheat Odin**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 208–09.

Tests conducted in the baking laboratory at Svalöf showed that Odin had a slightly lower crude protein content than Ergo, but the results of further tests are awaited. As regards gluten quality, Odin appears to have inherited the superior quality of the variety Gluten (cf. Abst. 207).

210. Shindo, S. and
Shimayama, Y.
(**On the hardy Sakhalin spring wheat variety Sakhalin 1**).
Proc. Crop Sci. Soc. Japan 1944 : **15** : 239–45.

A description is given of the spring wheat variety Sakhalin 1, bred to withstand the low temperatures of Sakhalin island. Its parents were the varieties Reward, from Ottawa, and Italian, from Australia.

211. MALIANI, C.
Una prova di fecondazione incrociata intrarazza sul frumento. (**An intravarietal cross fertilization experiment on wheat**).
Genetica Agraria, Roma 1948 : **2** : 91–99.

An experiment to test Russian claims regarding the advantageous effects of intravarietal crossing on yield in wheat was carried out with pure seed of the varieties Velino, San Pastore and Baudi. The cross pollinations, which were carried out by the usual method and by Lysenko's method, gave very high sets of seed, though the Russian method resulted in smaller kernels and ears deformed at the apex owing to incomplete protection of the seed consequent upon removal of the tips of the glumes to facilitate artificial pollination. No difference worth noting was observed in the size of the crop obtained from the cross pollinated seed and the self pollinated.
The Russian results may be due to heterosis ocurring as a consequence of impurity of the races crossed.

212. MATSUMURA, S. and
KONDO, N.
(**Varietal hybrids in the case of *Aegilops triuncialis***).
Bot. Mag. Tokyo 1942 : **56** : 227–34 [from Jap. J. Bot. 1943 : **12** : Abst. 168].

Genetical and cytological studies of hybrids obtained by crossing varieties of the above species have satisfied the authors that *Ae. persica* is a variety of *Ae. triuncialis* and not an independent species.

213. FORLANI, R.
Un ibrido di *Aegilops ovata* x *Secale cereale*. (**A hybrid of *Ae. ovata* x *S. cereale***).
Ann. Sper. Agrar., Roma 1950 : **4** : 561–67.

From pollination of four flowers of *Aegilops* with rye pollen four grains were obtained of which three were shrivelled and the other well formed. The first three failed to germinate, but the well formed grain produced one plant from which, by separating it into portions, each with at least one root, 12 plants were obtained. Ten of these were treated with colchicine and two retained as controls. The latter produced 123 ears, all sterile, while eight out of the ten yielded 409 ears which were sterile. Of the remaining two, one produced 48 ears of which 47 were sterile and one bore two grains, and the other produced 13 ears, 12 of which were sterile and one produced 5 grains.
The F_1 generation hybrid resembled *Aegilops* in its prostrate habit, low height, slender stem, auricles and leaf margins with short hairs, awned condition of the glumes and glumellae, and the large size of the glumes. The rye characters present in the F_1 were toughness of the rachis, pubescence of the upper node of the stem, vertical awns, glumes lacking in stiffness, and shape of the grain.
From the seven grains five plants were obtained which, if they attain maturity, will be further studied.
Cytological examination by G. Sermonti showed that the F_1 hybrid had 21 chromosomes, i.e. the sum of the haploid numbers for *Aegilops* ($n = 14$) and rye ($n = 7$). The origin of the hybrid was further borne out by the number and size of its nucleoli.

214. FORLANI, R.
Frumenti, discendenti da incrocio, riferibili a specie differenti da quelle dei genitori. (**Wheats, obtained by crossing, which belong to species different from those of the parents**).
Genetica Agraria, Roma 1948 : **1** : 330–34.

The following instances are recorded of interspecific crosses which in each case gave progeny resembling a third species: *Triticum vulgare* (Inallettabile 96) x *T. durum* (Cappelli)

produced a plant in F_5 resembling *T. Spelta*; *T. vulgare* (Mentana) x *T. dicoccum* gave seven F_4 plants resembling *T. Spelta* and in the same cross with a different variety of *T. dicoccum* two speltoids appeared in the F_4; [*T. vulgare* (Damiano x *T. turgidum* (del Miracolo)] x *T. sphaerococcum* gave one speltiform F_1 plant, while the F_3 from *T. vulgare* (Damiano) x *T. turgidum* (del Miracolo) contained a plant like *T. compactum* and a similar plant was obtained in the F_3 from the same interspecific hybrid crossed by *T. dicoccum*; *T. vulgare* (Mentana) x [*T. vulgare* (Mentana) x *T. durum* (Cappelli)] gave an F_2 plant like *T. turgidum* (del Miracolo), which was completely sterile. Other similar instances, in which, however, the influence of foreign pollen could not be definitely excluded, are also cited.

215. Forlani, R.
Ibridi di *Triticum monococcum*. (**Hybrids of *T. monococcum***).
Genetica Agraria, Roma 1948 : **1** : 344–50.

T. monococcum, which is immune to many common fungous diseases, was used as a pollinator in numerous crosses made by the author during 1934–45 with *T. vulgare*, *T. durum*, *T. turgidum*, *T. Spelta*, *T. dicoccum*, *Secale cereale*, *Aegilops ovata* and various polyhybrids. About 92 different hybrid combinations and repetitions of the same crosses were attempted. From the 1000 flowers pollinated only 12 seeds were obtained and 6 of these either failed to germinate or produced plants that failed to ear. The remaining 6 hybrid grains yielded both plants and ears, in four cases a single plant each, and in two cases two plants each. No crosses yielded an F_1 if the mother plant was a tetraploid wheat. An F_1 was obtained when *T. dicoccum*, *T. durum* or *T. turgidum* were used as the mother plant. The hybrid *T. dicoccum* x *T. monococcum* alone gave a fertile F_1 represented by two grains, from which two sterile plants developed.

216. Forlani, R.
Ibridi di *Triticum timococcum*. (**Hybrids of *T. timococcum***).
Genetica Agraria, Roma 1948 : **2** : 148–54.

The classification of wheats on the basis of their chromosome number is set out. The various species cross readily with other members of their groups, with the exception of *T. Timopheevi* and *T. dicoccoides*.
The writer, having received a small quantity of *T. timococcum*, carried out about 1300 pollinations over a period of five years, using *T. timococcum* as the male or female parent with *T. monococcum*, *T. dicoccum*, *T. durum*, *T. turgidum*, *T. Spelta*, *T. sphaerococcum* or *T. vulgare*. With one exception all results were negative, no set or only a few shrivelled grains which produced no plants being obtained. The successful cross was *T. vulgare* (Damiano) x *T. timococcum* which in 1945 gave one F_1 plant, from which two grains, due to accidental pollination, were obtained. From these two grains two F_2 plants resulted and from these 17 ears developed, 15 of which were sterile. The remaining two ears yielded 14 grains and an F_3 of ten plants, all fertile in varying degrees, except one practically sterile plant which set only one seed. The F_4 is now being raised and it is hoped that among the offspring some plants may be found with the disease resistance of *T. timococcum* whose parents exhibited that characteristic.

217. Dionigi, A.
Ibridi reciproci di *Aegilops ovata* e frumento. (**Reciprocal hybrids of *Ae. ovata* and wheat**).
Genetica Agraria, Roma 1948 : **1** : 376–78.

In the post germination stages the F_1 reciprocal hybrids from crosses between *Ae. ovata* and M.33 showed no differences in development or form; but the presence of awns, usually a recessive character in wheats, exhibited partial dominance.

In the cross *Ae. ovata* x Mentana and its reciprocal, the F_1 plants resembled the female parent in grain colour and in tendency to germinate, but, in grain size, they were intermediate in the direct cross and superior to Mentana in the reciprocal. It would therefore appear that complementary development factors in *Aegilops* and in Mentana are operating in conjunction with prepotency of the maternal character due to the triploid origin of the endosperm.

218. Forlani, R.
Ibridi *Triticum* x *Secale*. (**Triticum x Secale hybrids**).
Genetica Agraria, Roma 1948 : **1** : 335–43.

Pollination of *T. monococcum*, *T. turgidum*, *T. durum* and *T. dicoccum* with rye gave negative results.
From 80 florets of *T. sphaerococcum* pollinated with rye one plant was obtained which was sterile. From two varieties of *T. vulgare* crossed by rye only two F_1 plants were obtained from pollination of 720 florets. Some success was attained with the crosses [*T. orientale* x *Agropyron glaucum*] x rye and [*T. lutescens* 062 x *A. glaucum*] x *S. cereale* and also *S. cereale* x *T. dicoccum*. The first mentioned gave a set of eight grains from which it is hoped to raise an F_2; the second gave two F_2 plants one of which produced 15 grains, so that an F_3 may perhaps be obtained; and the third cross yielded one F_2 plant which bore a small and completely sterile ear. Colchicine treatment is to be applied to some of the above mentioned eight grains.
The various plants obtained are morphologically described.

219. Nakajima, G.
Cytogenetical studies of the triple hybrid from F_1 *Triticum turgidum*, *Secale cereale* and *Triticum vulgare*.
Proc. Imp. Acad. Japan 1942 : **18** : 100–06 [from Jap. J. Bot. 1943 : **12** : Abst. 181].

T. turgidum x *S. cereale* hybrids were crossed with *T. vulgare* with 95% success. Chromosome numbers in the triple hybrids varied from 39 to 44, 42 being the most common and 43 being absent. The triple hybrids are of low stature compared with *T. turgidum*, *S. cereale* and hybrids between these two species.

220. Thompson, D. L. and
Grafius, J. E.
Cytological observations of the F_1 and two backcross generations of *Triticum vulgare* x *Agropyron trichophorum*.
Agron. J. 1950 : **42** : 298–303.

Crosses were successfully obtained between *T. vulgare* used as female parent and several selections of *A. trichophorum*. Individual plants differed in their ability to cross with wheat. All the F_1 plants were self sterile; they were generally intermediate between the two parents, but many characters were predominantly those of *A. trichophorum*. Two back cross generations were obtained using *T. vulgare* as the recurrent parent; only those plants having *A. trichophorum* 4 in their parentage were fertile in the back-crossing. A determination was made of the percentage of normal pollen in F_1 plants grouped according to their *A. trichophorum* parent; plants having *A. trichophorum* 4 in their parentage had the highest average percentage of normal pollen. All the first back cross plants had a chromosome number of $2n = 63$, and were evidently the result of fertilization of unreduced F_1 eggs; it is therefore assumed that they carry two complements of *T. vulgare* chromosomes and one of *A. trichophorum* chromosomes. The second back cross was composed of the same chromosome complements, but showed fewer univalents, presumably *A.*

trichophorum chromosomes. Cytological observations are reported on chromosome number, pairing relationship and number of bridges at anaphase I of the parents, F_1, and first and second back crosses. Observations were also made on normal pollen, micronuclei and lagging chromosomes at metaphase I and anaphase I. The average percentage of normal pollen increased in each generation. The number of micronuclei per quartet and number of lagging chromosomes decreased in the second back cross generation. After two back crosses to wheat, the pubescence and perennial habit of the *Agropyron* parent were retained; spike, awn and kernel characters resembled those of the wheat. Self and cross fertility increased with each generation; some F_1 and back cross plants were highly resistant to leaf rust.

221. FRANKEL, O. H.
A case of multiple mutation in wheat and its genetic and evolutionary significance. Report of the Sixth Science Congress, May 20-23 (inclusive) 1947.
Trans. Roy. Soc. N.Z. 1949 : p. 189. (Abst.).

A fuller account of the investigation described here has been published in *Hereditas* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1528).

222. UCHIKAWA, I.
Genetic and cytological studies of speltoid wheat II.
Mem. Coll. Sci. Kyoto 1941 : No. 50 [from Jap. J. Bot. 1941 : **11** : Abst. 528].

Details are given of the genetics and cytology of three series of speltoid wheats, A, B and C. The A series when selfed gives a ratio of 1 normal: 2 heterozygous speltoids: 1 homozygous speltoid, each with 42 chromosomes, and is thought to have arisen by mutation of dominant inhibiting genes in the C chromosome to the recessive condition. The segregation ratio for the B series is 1 normal: 4·5 heterozygous speltoids: 0·05 homozygous speltoids with a few other forms, the chromosome numbers being 42, 41 and 40 respectively. The origin of this series is attributed to elimination of the C chromosome. The deviation from the 1 : 2 : 1 ratio may be explained by the 21-chromosome male gametes being more effective than the 20-chromosome ones and the elimination of a certain number of homozygotic speltoids. The C series gives a ratio 1 normal: 1·1 heterozygous speltoids: 0·1 homozygous speltoids, the chromosome number being 42 in all three types. This series is considered to have arisen by fragmentation of the C chromosome into two pieces, S_1 and S_2, the deviation from the 1 : 2 : 1 ratio being accounted for by the greater effectiveness of the gametes with a complete C chromosome and by the elimination of a certain number of homozygous speltoids.

223. OLTMANN, W.
Züchterische Auswertung röntgeninduzierter Mutationen an physiologischen Merkmalen bei Winterweizen. (**Evaluation by breeding of mutations induced by X-rays in physiological characters in winter wheats**).
Z. Pflanzenz. 1950 : **29** : 76–89.

The winter wheats Hauter II, Heine IV and Walthari were irradiated by X-rays to obtain positive viable mutations for practical use and to evaluate useful mutants for breeding purposes. Hauter II gave especially satisfactory results.
It was found possible by induced mutations to effect modifications in the components of the complex physiological characters; the variations which occurred were usually unfavourable, but sometimes favourable; some strains of wheat showed mutation in several characteristics.

The practical value of these investigations lies in the fact that characters and qualities may be obtained, which though not yet discovered, are to be expected on the basis of the law of parallel variations. Moreover, by induced mutations in crop plants variations may be produced, especially in crop material which has been thoroughly investigated by breeding and in which only quite small improvements can be produced by the ordinary methods of breeding.
Tables are given showing the effect on baking quality, frost resistance, shooting time, length of stem and resistance to lodging of wheats irradiated to cause mutations. The difficulties of breeding for improvement in physiological characters are discussed, with numerous references to results obtained by previous workers.

224. Bottazzi, G. B.
Per non tornare indietro!. In difesa dei grani eletti. (**So that we may not turn back. In defence of élite wheats**).
Genetica Agraria, Roma 1948 : **2** : 155–68.

Evidence from crop yields in Italy from 1928 onwards is advanced to refute critics of the Strampelli wheats which the writer maintains have considerable value for Italian agriculture owing to their productivity and earliness. The latter characteristic, in the writer's opinion, is not incompatible with cold resistance.

225. Lein, A.
Asiatische Weizensortimente. (Vergleichende Studien an Weizensammlungen der Deutschen Hindukusch-Expedition 1935–36, der Indien-Nepal-Fahrt Herrlichs 1937–38 und der Tibet-Expedition 1938–39). [**Asiatic wheat collections. (Comparative studies of wheat collections of the German Hindu Kush Expedition 1935-36, of Herrlich's travels in India and Nepal 1937-38 and of the Tibet Expedition 1938-39)**].
Kühn-Arch. 1949 : **62** : 216–310.

The characteristics of the geographical Formenkreise of the Asiatic wheats from Tibet, India and the Hindu Kush regions are described and summarized in tabular form. Vavilov's theory of gene centres of origin is discussed and the writer's attitude to his theory and to Schiemann's views is fully explained.
From this preliminary study of the above wheat collections it is concluded that the multiplicity of forms of the wheats of the Hindu Kush region, though great, is neither greater than nor equal to the multiplicity of other populations in neighbouring parts, and it is held that this applies to other regions west of the gene centres of origin, as is seen from previous workers' results relating to wheats of the Near East.

226. Kihara, H. and
Matsumura, S.
Ueber die Univalentenelimination in den verschieden-chromosomigen Nachkommen des pentaploiden *Triticum*-Bastards. (**On the univalent elimination in the offspring of the pentaploid *Triticum* hybrid that have different chromosome numbers**).
Jap. J. Bot. 1942 : **12** : 225–36.

Pentaploid *Triticum* hybrids between the Emmer and spelt wheats exhibit 14 bivalents and 7 univalents. The bivalents undergo normal reduction in the heterotypic or homotypic division, usually dividing longitudinally at anaphase I, with subsequent distribution of the halves to both poles. The univalents sometimes lag and, without reaching the pole, remain as dwarf nuclei during tetrad formation in the pollen mother cells.

The frequency of elimination of univalents depends on (1) the species combined in the hybrid, e.g. 21·10% in *T. durum* x *T. vulgare* as compared with 13·38% in *T. polonicum* x *T. Spelta*; and (2) which of the six spelt univalents (*b, c, d, e, f* and *g*) is concerned. No dwarf nuclei lacking the *a* chromosome have yet been found. From a study of *T. polonicum* x *T. Spelta* and the two back crosses, it was found that the *f* and *g* chromosomes showed the highest elimination frequency, and *c* and *d* the lowest. In general elimination was higher in plants with low chromosome numbers than in the plants with the higher chromosome numbers. Reasons for this difference are suggested.
Statistical examination of the frequency of microspores with the various dwarf nuclei indicated that the univalents in the hybrid between *T. polonicum* and *T. Spelta* are distributed at random to the poles in the second maturation division.

227. Yamashita, K.
(Offspring of triploid wheat hybrids).
Seiken Jiho (Biological Report) 1943 : No. 2 : 4–13.

Detailed cytological descriptions are given of two plants obtained by open pollination of *Triticum polonicum* x *T. aegilopoides*, and one plant obtained by open pollination of *T. turgidum* x *T. monococcum*. The putative pollen parents were wheat e-giant, *T. compactum* and *T. Timopheevi* respectively.

228. Unrau, J.,
Smith, W. E. and
McGinnis, R. C.
Spike density, speltoidy, and compactoidy in hexaploid wheat.
Canad. J. Res. 1950 : **28** : Sect. C : 273–76.

A study was made of the F_2 progeny from a cross between the variety Chinese Spring (*Triticum vulgare*) deficient in chromosome IX and Hywar (*T. compactum*). Among the plants with 21 pairs of chromosomes, carrying two IX chromosomes, the spikes were of the club, intermediate or lax common type. Monosomic plants also developed the club, intermediate or common type of spike, but all had typical speltoid characteristics regardless of spike density. If the data from both groups of plants are combined, the results show a 1 : 2 : 1 ratio of dense, intermediate and lax spiked plants. Chromosome IX is therefore not associated with inheritance of spike type. It is suggested that subcompactoidy and compactoidy resulting from an increase in the dosage of chromosome IX is caused by an increase in the dosage of the gene for squareheadedness carried by this chromosome. The general shortening observed in plants having higher dosages of chromosome IX may be caused by lack of genetical balance due to the aberrant chromosomal constitution.

229. Oehler, E. and
Tweifel, J.
Considérations sur la longévité des graines de blé. **(Considerations on the duration of viability of grains of wheat).**
Rev. Romande Agric. Viticult. Arboricult. 1950 : **6** : 41–42.

Observations in Switzerland have shown that the claims made for wheats like the Blé Osiris, a Rivet wheat with branched ears (*Triticum turgidum* var. *mirabile*), and Blé des Pharaons are unfounded. Historical facts and recent information from Egypt confirm this conclusion (cf. *Plant Breeding Abstracts*, Vol. XX, Absts. 869 and 1557).

230. AGINJAN, A. A.
(Vernalization in relation to the embryonic development of the seed).
Agrobiologija (Agrobiology) 1950 : No. 3 : 56–66.

Vernalization studies with seed of the winter wheats Krasnodarka [Krasnodar] and Ukrainka [Ukrainian] at the Armenian Agricultural Institute in Erevan are reported.

231. KORJUKAEV, S. I. and
VINOGRADOVA, E. I.
(The length of the vernalization phase in winter wheats in relation to the time of harvesting of the grain).
Agrobiologija (Agrobiology) 1950 : No. 3 : 67–69.

Vernalization experiments with the wheats Djurablj [Durable] and DS2444–2, conducted at Leningrad in 1948, showed that (1) the longer vernalization treatments were more effective in hastening earing in the case of grain harvested at all the stages of maturity, and (2) the plants from the seed harvested at full maturity on 15 August were retarded in their development, only few individuals reaching the earing stage, and were less advanced than those from the seed gathered on 10 July when it had reached milk ripeness and 30 July when it attained waxy ripeness respectively. In 1949, Borovičskaja [Borovičі] wheat was introduced in the trials. The grain of all three varieties was gathered on 17, 23 and 28 July and 25 August. It was not vernalized before planting in the field on 22 April. As a result of vernalization under field conditions the plants from all early harvested seed eared or began earing on 15 September, but Borovičskaja and Durable plants grown from fully mature seed failed to produce ears, while the late harvested grain of DS2444–2 gave only a few earing plants.
The results of the experiments are interpreted as evidence against the theory, put forward by I. A. Kostjučenko and T. Ja. Zarubaïlo, that the seed passes its vernalization phase on its mother plant. At the same time the findings of the two writers that not fully mature seed passes through its vernalization phase more rapidly than mature seed have been confirmed.

232. SIEV (WEISS) [ZIV], D.
Studies of the phenology of some wheat varieties in Palestine.
Palest. J. Bot. 1949 : **7** : R. Ser. : 53–62.

In Palestine wheat usually germinates in November or later, according to the beginning of the rainy season. Its tillering occurs partly in the period of shortening days, partly in that of lengthening days; days in both periods, however, are shorter than twelve hours. Shooting occurs in the period of lengthening days and the stage of heading is reached in days shorter or longer than twelve hours, according to the variety.
Data are reported on the length of the period from germination to heading in the late maturing *Triticum durum* varieties Nursi and Etti and the early maturing *T. vulgare* wheats BIPM, CCC and Florence, when sown at different dates.
The early varieties passed through their early developmental stages until shooting, and even heading, at relatively high temperatures; thus it is doubtful whether an obligatory cool thermostage can be attributed to these varieties.
Data on heading in the early varieties suggested that heading did not entirely depend upon photostage. With all sowing times, the late varieties showed a delay between the end of the shooting stage and emergence of the spike, apparently due to the fact that the photostage is composed of several secondary developmental phases, each requiring its specific ratio between light and darkness.
All the varieties continued to form vegetative tillers while part of their tillers already possessed a reproductive growing point. The early varieties continued tillering long after

heading and even after part of their grains had matured. Lysenko's principle that the developmental stages of annual plants follow one another in a fixed predetermined scheme was only verified with regard to each separate tiller. The plant as a whole, after reaching the terminal stage of flowering and maturing, repeatedly passed through the previous stage of tillering.
Ordinarily under field conditions in Palestine, wheat after heading ceases to tiller; this cessation is ascribed to the conditions of summer drought. But in the experimental plots, the early wheats tillered in every case when days were short, whether before or after heading. It is considered that when long days follow short ones, the order of stages postulated by Lysenko is correct. When however the order is reversed, i.e. when short days follow long ones, and growing conditions are favourable, the vegetativeness is evidently due to the immediate effect of the influence of external conditions but not of the inherent order of successive stages.

233. Dionigi, A.
Eredità del carattere "accestimento" nei cereali. (**The inheritance of the character, tillering capacity in cereals**).
Genetica Agraria, Roma 1948 : **2** : 100–06.

Tillering capacity may be determined by factors affecting vegetative vigour or by factors affecting the intensity of sexual reproduction.
In the wheat crosses M 33 x M 33 A and M 33 x Mentana no significant differences were observed in the reciprocal crosses as regards the inheritance of tillering capacity. In the two crosses the character varied within the parental limits with a tendency to the lower of the two limits. Since tillering capacity and number of leaves were both correlated with rate of development they could be used as an index of the variability of the latter characteristic.

234. Urzua, A. H.
Estudio de la composición química de los trigos Chilenos en relación a la variedad y al año de cosecha. (**Study of the chemical composition of the Chilean wheats in relation to variety and harvest year**).
Agric. Téc. Chile 1949 : **9** : 11–27.

Analyses were made on 182 samples, comprising 18 varieties from the 1947–48 harvest, and figures are presented for 100 corn weight, humidity, and content of ash, Ca, P, Fe, carbohydrates, thiamin, riboflavin and niacin. A comparison of the results for different varieties indicated that Cappelli was the highest in minerals, vitamins and nitrogen, whilst Vilmorin 23 and 29 and Barón appeared to be among the lowest.

235. Dionigi, A.
Eredità del carattere "numero delle foglie" nel frumento. (**The inheritance of the character, number of leaves, in wheat**).
Genetica Agraria, Roma 1948 : **2** : 85–90.

The total number of leaves differentiated from the primary shoot during the whole vegetative cycle in wheat is a varietal character, which in a number of crosses of different varieties behaved similarly in the direct and the reciprocal cross. The character was typical for each hybrid and its expression ranged between the parental limits, with a tendency to approach that of the parent with the fewer leaves. The number of leaves can be used as an index of the rate of development of the plant.

236.
Note sur le blé à épis ramifiés en Égypte. (**Note on wheat with branching ears in Egypt**).
Bull. Un. Agric. Égypte 1949 : **47** : p. 146.

Branching of the ear in wheat is merely an anomaly of vegetative development and not a genetic character. The aberrant form of ear may result from the reaction of particularly vigorous ears to insect puncture accompanied by special environmental conditions which may have happened to coincide in certain years. It is not a constant varietal character and yield calculations per ha. are merely conjectures.
In Beni Berzah in Upper Egypt, reputed to produce numerous branched wheat ears, the author found none in 20 years of residence there.

237. Scurti, J.
Sulle caratteristiche fisiche, chimiche e biologiche che i semi di frumento debbono possedere per la maggiore economia nella semina e il più elevato rendimento nella produzione. (**On the physical, chemical and biological characteristics that wheat seed must possess to ensure greatest economy in sowing and the highest yield in production**).
Annuario Ist. Speriment. Chim. Agrar. Torino 1946–1948 : **16** : 33–61.

Determinations were carried out of the weight, volume, longitudinal and transverse diameters of large and small wheat kernels and the average length of their embryos and endosperms, as well as the relation between the average length of embryo and endosperm and the average content of moist and dry gluten, using the varieties Damiano Chiesa, Villa Glori and Mentana.
In spite of their higher germination energy, the small kernels showed no biological superiority. Nevertheless, their yield was equal to that obtained from large kernels, since, in spite of their inferiority in plant size, root system and number of ears and grains produced, when sown by weight of grain, the stand contained double the number of plants obtained from an equal weight of large kernels. Finally, the size of the seed sown did not affect the proportion of large and small kernels in the resulting crop.

238. Giacanelli, E.
Il metodo Pelshenke nella valutazione dei frumenti. (**Pelshenke's method for determining the baking value of wheats**).
Genetica Agraria, Roma 1948 : **2** : 1–8.

Determinations of the quality of wheat flours in Italy showed that in 80% of cases the results obtained by the Pelshenke method agreed with those obtained by baking tests. Italian wheat breeders may therefore use the Pelshenke test with confidence.

239. Boyce, S. and
Boyce, R. W.
Relative dominance of grain weight in wheat. Report of the Sixth Science Congress May 20-23 (inclusive) 1947.
Trans. Roy. Soc. N.Z. 1949 : **77** : p. 190. (Abst.).

"Inheritance of grain weight in four *Triticum* crosses was discussed. In one case there is evidence of segregation for a simple recessive gene for high grain weight. In the remaining crosses high grain weight is either completely or partially dominant, number of genes segregating being indefinite." [Authors' summary].

240. Dionigi, A.
I frumenti per la montagna. I. La varietà "M 33 A." **(Wheats for the mountain regions. I. The variety M 33 A.**
Genetica Agraria, Roma 1948 : **2** : 50–72.

The greater part of this article is concerned with the author's definitions of terms such as mountain region and adaptation, and with a general presentation of some of his theories on the physiological factors affecting cold resistance in winter wheats.
In conclusion mention is made of the spring wheat M 33 A, bred from the cross Mentana x M 33 and characterized by rapid growth and high yield.

241. Livingston, J. E. and
Swinbank, J. C.
Some factors influencing the injury to winter wheat heads by low temperatures.
Agron. J. 1950 : **42** : 153–57.

Experiments were carried out to study the following factors in relation to frost injury of wheat heads: (1) stage of development; (2) relationship between temperature and length of exposure; (3) soil fertility; (4) free moisture on the heads; and (5) varietal tolerance of frost injury. Varieties differed in floral susceptibility to frost. Evidence was also obtained that winter hardiness in the seedling stage and frost injury to the head are not necessarily related.

242. Petinov, N. S.
(On the results of the expedition sent by the Timirjazev Institute of Plant Physiology to the Kursk province).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 10 : 76–79.

The differences in resistance to drought and in response to subsequent watering treatments were studied in several spring wheats.
Lutescens 062 was more tolerant of drought than Lutescens 605, the wheat-*Agropyron* hybrid 22850 and Hordeiforme 010, but 22850 was capable of a rapid recovery after watering and out-yielded Lutescens 062. The respective yields of the two varieties were 35·1 c. per ha. and 26·5 c. per ha. after watering, and 11·4 c. per ha. and 16·2 c. per ha. under extreme conditions of drought.

243. Cormack, R. G. H.
A study of the leaf thickness in wheat.
Agron. J. 1950 : **42** : p. 361.

A study of 29 wheat varieties revealed that leaf thickness is a varietal characteristic; a wide difference exists between varieties with the thickest and thinnest leaves. If, therefore, a relationship between leaf thickness and resistance to drought can be established, it would appear that determination of leaf thickness would be a comparatively simple method of selecting wheats for drought resistance.

244. Lowther, C. V.
Pathogenicity of physiologic races of *Erysiphe graminis tritici* in the south-eastern United States.
Phytopathology 1950 : **40** : p. 872. (Abst.).

The appearance of new races of the pathogen and the reactions of wheat varieties are discussed. A few non-commercial wheats having a high degree of resistance to all races so far identified are available for use in breeding.

245. TAPKE, V. F.
Flaccidity, turgidity and predisposition in barley and wheat as factors in susceptibility to powdery mildew (*Erysiphe graminis* DC.).
Phytopathology 1950 : **40** : 873–74. (Abst.),

Plants grown in the greenhouse or under conditions promoting a tender, succulent growth, proved more susceptible than plants grown under conditions promoting a toughened growth. Flaccid and turgid plants appeared equally susceptible.

246. MEYER, H.
Über den Einfluss von Cadmium auf die Krankheitsbereitschaft des Weizens für *Erysiphe graminis tritici* Marchal. (**On the influence of cadmium upon the proneness of wheat to *E. graminis tritici* Marchal**).
Phytopath. Z. 1950 : **17** : 63–80.

Experiments on some wheats show that though the cadmium content of the plant reduces the amount of infection by *E. graminis* var. *Tritici*, other factors must also be concerned in the change in the susceptibility of the host plant.

247. CHESTER, K. S.
The significance of usefulness of the leaf-rust reactions of Pawnee wheat.
Proc. Okla. Acad. Sci. 1947 : **27** : 71–74.

The decline in the leaf rust resistance of Pawnee during 1943–46 in the Southern Great Plains is attributed to a shift in the biotype composition of the pathogen. Race 9, to which Pawnee is resistant, has now been largely replaced by other biotypes.

248. GOKHALE, V. P.
A new biotype of race 15 of *Puccinia graminis Tritici*.
Curr. Sci. 1950 : **19** : 214–15.

The occurrence of a new biotype of race 15 of *P. graminis* var. *Tritici*, designated 15C, is reported. The biotype was isolated from the wheat Charter, which had hitherto proved rust resistant. Introduced wheats at present being used in breeding rust resistant varieties for the states of Bombay and Madhya Pradesh are susceptible to 15C; the hybridization programme will therefore have to be modified accordingly. Some varieties, e.g. Kenya E 144 and C 9906, are resistant to both the old and new biotypes.

249. HANSON, E. W.,
AUSEMUS, E. R. and
STAKMAN, E. C.
Varietal resistance of spring wheats to fusarial head blight.
Phytopathology 1950 : **40** : 902–14.

In the past 15 years many varieties and hybrid selections of *Triticum* spp. have been tested for resistance to head blight, mainly due to *Fusarium* and *Gibberella Zeae*, in shaded and unshaded plots in the field, under both natural and artificially created epidemic conditions. Only a few wheats have proved relatively resistant, Progress and Haynes Bluestem being the most resistant of all the varieties studied. Relative differences in resistance to blight can be determined readily by growing varieties under epidemic conditions. Under conditions in Minnesota early varieties tend to develop more blight than late ones.

Moisture and temperature during the critical period from flowering to the medium dough stage appear to be more important than time of heading in determining the relative amount of blight on early and late varieties. Preliminary studies on the inheritance of varietal reaction to blight have been made. Certain F_2 progenies had percentages of plants in the resistant classes as high as or higher than those shown by the parents. Evidence of segregation in the F_3 generation of a cross between H44-Thatcher and Haynes Bluestem was obtained, some of the segregants being as resistant as the resistant parent.

250. GRAFIUS, J. E. and HEHN, E. R.
Factors associated with grasshopper resistance in four spring wheat crosses.
Agron. J. 1950 : **42** : 342–44.

In a previous paper (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 903) strong negative correlation coefficients were obtained between amount of mechanical tissue in the upper part of the culm and susceptibility to grasshopper (*Melanoplus bivittatus*); the number of heads clipped was used as the measure of resistance. Breaking strength and diameter of the dried culm just below the peduncle were found to be valid indications of grasshopper resistance, instead of the amount of mechanical tissue whose determination was too laborious. The present paper reports further studies on the crosses Clarendon x Thatcher, Thatcher x Triunfo, Reward x Thatcher and Clarendon x Reward; Clarendon and Triunfo are resistant to *M. bivittatus*, whereas Thatcher and Reward show susceptibility.
The F_3 means of crosses of the type resistant x susceptible exceeded the means of the cross between two susceptible varieties, Reward x Thatcher, by a significant difference for both diameter and breaking strength. Two crosses of the type resistant x susceptible were continued in the F_4; significant correlations were established between the means of the F_3 and F_4 families for both measurements. A total of 20 F_5 families from two resistant x susceptible crosses were subjected to attack by grasshoppers of the species *M. differentialis*. A correlation coefficient of $-0{\cdot}48$ ($p < 0{\cdot}05$) was obtained between breaking strength of culm and percentage of heads clipped; but no significant relationship was found between culm diameter and grasshopper injury. Possibly this was due to the influence of leaf rust; the infection may have hindered the differentiation of mechanical tissue by using the sugars normally available for this process.

251. STRAND, E.
Resultater av sortsforsøk med høsthvete. (**Results of variety trials with autumn wheat**).
Norsk Landbr. 1950 : **16** : 308–11.

The performance is recorded of Norwegian and Swedish wheats in variety trials from 1937–38 to 1948–49 in 62 localities in Norway. Yield, winter hardiness, strength of straw, vegetative period and 1000 corn weight were recorded. The varieties and lines that gave the best yields were a series of improved hybrids from Th0102 x Sol. The best lines from this cross are winter hardy and relatively high yielding, but the straw is weak; one of them, 055–2,B30, possibly to be released under the name Follo, surpassed the standard Th0102 in yield of grain by 17% on the average for 12 years at one experimental farm.

252. GREEN, J. M.
Wheat has two advantages over oats, tests show.
Miss. Fm Res. 1948 : **11** : No. 9 : p. 7.

The yields, maturity, height, lodging and rust reaction of nine wheat varieties tested on sandy loam and their percentage survival, maturity, height and yield in a test on clay soil are indicated. Chancellor consistently outyielded the other varieties.

253. PLAUT, M. and
SALTSBUCH, B.
(The cultivation of oats in Israel).
Hassadeh 1950 : **30** : 415–16.

Analysis of grains of the oat varieties Polgos, Molga and Uruguay, grown in various parts of Israel and harvested in 1946 and 1947, showed that in composition the grains did not differ from those grown elsewhere, especially in the United States, the country from which the seed material had been originally introduced. Mention is also made of distinct local strains, which are not of *Avena sativa* parentage. It is hoped that these strains will eventually be improved and made useful to industry for various purposes.

254. OLDAKER, C. E. W.
Sir Douglas Haig oats—some notes on the variety.
Tasm. J. Agric. 1948 : **19** : 104–05.

The characteristics of the old oat variety Sir Douglas Haig, originally produced by Gartons, England, from a cross between Supreme (*Avena orientalis*) and *A. nuda*, are discussed. It is thought that the variety should have a more important place in inland districts in Tasmania.

255. ÅKERMAN, Å.
Svalöfs Blendahavre (01550). [**The Svalöf oat Blenda (01550)**].
Sverig Utsädesfören. Tidskr. 1950 : **60** : 285–89.

Since 1944 Blenda, an élite from a reselection from Sol II (Stjärn) [Star x Örn [Eagle]), has been tested in the Swedish Seed Association's trials and since 1947 in local Swedish trials supervised by the National Agricultural Research Institute.
Blenda is very like Sol II, but ripens 1–2 days earlier and has surpassed it by about 4·2% in yield on the average from 149 trials. Its outstanding quality of grain is only surpassed by Ligowo and in strength of straw it equals Örn. The grain, which is large, plump and white, has a faint yellowish tinge. The yield of straw is low. Hectolitre weight, thousand corn weight and ratio of grain to husk are as high as in Guldregn [Golden Rain] II (cf. Abst. 139).

256.
Three new winter oats for southeast.
Seed World 1950 : **67** : No. 5 : p. 16.

A note is presented on the characteristics of the varieties Atlantic, Arlington and Coy (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1582).

257.
Winter-resisting oats developed by Texas scientists.
Seed World 1950 : **67** : No. 4 : p. 29.

A note is presented on the new oat variety Mustang developed in Texas.

258. FREY, K. J. and
WATSON, G. I.
Chemical studies on oats. I. Thiamine, niacin, riboflavin, and pantothenic acid.
Agron. J. 1950 : **42** : 434–36.

The contents of the above substances and the percentage of protein in 16 common oat varieties and the relationships between these constituents are indicated. A breeding procedure for the improvement of oats as a source of riboflavin and pantothenic acid is suggested.

259. Flanagan, T. R. and
Washko, J. B.
Spring grain characteristics which influence their value as companion crops.
Agron. J. 1950 : **42** : p. 460.

The values as companion crops for legumes of six varieties of oats and one of barley are discussed. Light intensity as measured by reflected light provided an indication of the competitive effect between the various cereal varieties and the legume seedlings.

260. Pfeiffer, R.
Hafersortenfrage und Resistenzzüchtung im Alpenraum. (**The problem of oat varieties and resistance breeding in the alpine region**).
Bodenkultur, Wien 1950 : **4** : 166–85.

The need is stressed for breeding new oat varieties which are resistant to lodging, black stem rust and frit fly and suitable for cultivation in the alpine parts of Austria.
The theoretical basis of the methods to be used is described, with special reference to American results obtained under similar conditions. The results of the preliminary work at Admont of identifying the endemic physiological races of black stem rust and hybridizing oat varieties are described. It is highly probable that the factor for resistance to black stem rust is dominant and monofactorially inherited. No linkage between genetic resistance and other morphological or physiological characters has been found. Segregation in the F_2 material of 1949 has already given some clearly resistant types, which are to be isolated for further work.
Absolute resistance of oats to *Oscinella Frit* is unknown, though some Scandinavian varieties, which have a 40% lower susceptibility, are described as resistant. Observations on a large world collection of oats have shown that the varieties in Admont differ in susceptibility.

261. Stevens, N. E. and
Scott, W. O.
How long will present spring oat varieties last in the central corn belt.
Agron. J. 1950 : **42** : 307–09.

Factors responsible for the short period for which most oat varieties are commercially cultivated are discussed. Susceptibility to disease has been the most common cause of the abandonment of a given variety; this is to be expected when large areas of varieties with similar parentage are grown in the presence of variable pathogens. Past experience with the newer varieties in relation to oat diseases is reviewed. The period of popularity of a variety may perhaps be most accurately measured from the peak of certification to the time when the acreage becomes of minor importance; on this basis the life of the newer varieties has varied from 1 to 12 years.

262. Kehr, W. R.,
Hayes, H. K.,
Moore, M. B. and
Stakman, E. C.
The present status of breeding rust resistant oats at the Minnesota Station.
Agron. J. 1950 : **42** : 356–59.

A review is presented of breeding and genetical work on resistance to stem and crown rust, with particular reference to experience gained at the Minnesota Agricultural Experiment

Station: Current work includes the following investigations:—
In 1949 yield trials were conducted at the Central and Branch Stations on selections from crosses of (Bond x White Russian) or (Bond x Rainbow or Iogold) with two Canadian selections from the combinations Hajira-Joanette or Victoria-Hajira-Banner. Whether the selections under trial carry only the factor of the Canadian derivatives for resistance to stem rust or this factor in combination with the factors for resistance possessed by White Russian or Rainbow is not yet known.
In the crosses Landhafer x (Mindo x Hajira-Joanette) and Landhafer x (Bond-Rainbow x Hajira-Joanette), the resistance of Landhafer to all races of crown rust has been combined with the resistance of the Canadian oats Hajira-Joanette to all races of stem rust.
The stem and crown rust resistance of Saia, a selection of *Avena strigosa* from Brazil, is under investigation; the chromosome number of the selection is being doubled in the hope of facilitating hybridization with *A. sativa*.
An attempt is being made to combine the resistance of these two Canadian derivatives of Hajira-Joanette and Victoria-Hajira-Banner to stem rust with that of White Russian or Richland-Rainbow-Iogold. The differential response of the types of resistance to temperature conditions offers a possible means of testing for the presence of two types of resistance in a single line.
The resistance to all races of crown rust carried by Landhafer was found to be distinct from that of Bond. In order to recognize the combination of these two types of resistance, use is being made of a differential response of the two types of resistance to some races under certain environmental conditions.
Except in the case of the close linkage between the type of crown rust resistance carried by Victoria and susceptibility to *Helminthosporium Victoriae* the work of the oat breeder does not appear to be complicated seriously by genetic linkages.

263. Cooper, J. F.
New oat fights blight.
Sth. Seedsman 1950 : **13** : No. 9 : p. 26.

The new oat variety Southland, developed at the North Florida Agricultural Experiment Station from a cross made in Iowa, is medium early, resistant to Victoria blight, moderately resistant to crown rust, and susceptible to stem rust and lodging. The variety is not resistant to cold and is therefore only adapted to the Gulf Coast area.

264. Opsahl, B.
Forsøk med havresortar. (**Trials with oat varieties**).
Forskning, Forsk. Landbruk, Oslo 1950 : **1** : 3–34.

A detailed review is given of extensive trials of oats at Forus Experimental Farm and other farms in western Norway. In addition to Swedish and Danish varieties the following Norwegian and Finnish varieties were tested: Rygja from a cross of Fransk Svarthavre [French Black-hulled oat] with Sølv [Silver] II; Jøtul and Merkur, each derived from a cross of the Vestland grey oat with Sølv; Tempo, from a cross of Fransk Svarthavre and Favorit [Favourite]; Kytö, from a cross of Guldregn [Golden Rain] and a Finnish land oat; J2, a line selection from the Vestland grey oat; Trond; 91S-18/41; Hird; and Strind.
Rygja, bred at the Forus Station, surpassed all the other varieties in yield, is resistant to lodging and has grain of high quality though the husk percentage is somewhat high (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 252).

265. Green, J. M.
Oat varieties for Mississippi Delta.
Miss. Fm Res. 1948 : **11** : No. 9 : p. 6.

Data are presented on the yield and reaction to Victoria blight of oat varieties in Mississippi. Nortex 107, Delta Red 88 and Stanton and the early varieties Victorgrain and Fulgrain are recommended for the Delta area.

266. IVANOFF, S. S. *ET AL*
Oat varieties compared in station tests.
Miss. Fm Res. 1949 : **12** : No. 8 : 1, 2.

By varietal testing and breeding, high yielding oat varieties resistant to leaf rust, Victoria blight and cold are being sought at the Mississippi Experiment Station. The characteristics are given of the four groups of varieties grown in Mississippi: Red Rustproof, Tennessee Winter Hardy, Victoria hybrids and Bond hybrids. Grain yields of varieties grown at different locations in 1947–48 and 1948–49 are tabulated and discussed with reference to rust incidence and other factors affecting yield.

267. GILL, J. B. and
JOHNSON, H. A.
Oats yield more than other grains in grazing tests.
Miss. Fm Res. 1949 : **12** : No. 8 : 2, 8.

Grazing tests with 18 varieties of oats, two of wheat, two of barley and one of rye are reported. Oats were superior to the other cereals. In general, varieties outstanding for forage production were also best for grain.

RYE

268.
New variety of rye.
Soviet News 1950 : No. 2423 : p. 2.

Mention is made of a new winter rye named Alma Ata Long Ear, which has been developed in the Kazah Republic. It is said to possess an ear more than 10 inches long and a 1000 grain weight up to 1½ oz.

269. MÜNTZING, A.
Accessory chromosomes in rye populations from Turkey and Afghanistan.
Hereditas, Lund 1950 : **36** : 507–09. (Abst.).

The accessory chromosomes of rye previously studied by the author were derived from two Swedish varieties Östgöta Gråråg and Vasa II. The present paper gives data on B chromosomes in more primitive strains of rye.
The highest frequencies of B chromosomes seem to be met with in the most primitive strains growing as weeds.
The B chromosomes are of the same morphological type as the so-called standard fragment of the Swedish varieties, though there would seem to be some small but significant differences observable at pachytene between the Swedish and Turkish material.
Crosses within the TII strain showed that the standard fragments are capable of the great increase in number characteristic of Vasa II. The same mechanism is evidently at work also in TI and probably occurs in the other strains with B chromosomes.

270. BUCHINGER, A.
Verzweigter Roggen. **(Branched rye).**
Pflug, Wien 1950 : **3** : No. 1 : Pp. 1.

A branch rye grown in Kornberg is described. It originated in material from Lannach, Steiermark; the author thinks that this branched rye may have come from a collection

from the regions north of the Hindu Kush-Pamir region which are held to be a centre of gene variation.
Though branched rye is of no practical significance it is possible that later new high yielding forms might be found or bred. The greater likelihood of finding autogamous forms in such rye than in ordinary rye is pointed out.

MAIZE

271. Anderson, J. C. (Editor),
MacFarland, C. S. (Jun.) (Publisher).
1950 American Corn Annual : Pp. 44.

The annual includes: statistics on maize production in the USA; information on the personnel of the executive committees of maize improvement conferences; a note on the origin of maize; information on seed certification standards for inbred, hybrid and open-pollinated maize; an article "The hybrid corn of tomorrow," by M. T. Jenkins; a list of recent references on various aspects of maize production including genetics and breeding; definitions and descriptions of maize and maize products; a list of the chief maize breeders in the different States; and a list of periodicals of interest to those engaged in the industry.

272. Frolik, E. F. and
Morris, R.
Xenia effects of irradiating corn pollen in a nuclear reactor.
Agron. J. 1950 : **42** : 293–97.

Mature tassels of maize plants having the genotype *AAPrPrSuSu* were irradiated in the thermal neutron column of a heavy water pile and the pollen was later placed on ear shoots of plants carrying the genotype *aaprprsusu*. Data were obtained on the occurrence of mutants involving the loci *A*, *Pr* and *Su* in the aleurone and endosperm of mature F_1 kernels; frequencies of defective kernels were also recorded. The results were compared with those from crosses made with pollen from X-rayed and non-irradiated tassels. The percentage of mutants produced by both sources of radiation showed the following decreasing order of frequency: defective kernels, colourless aleurone, sugary endosperm and red aleurone. No qualitative differences were detected in the effects of the two types of radiation.

273. Jenkins, M. T.
Report of the Eighth Southern Corn Improvement Conference, State College and Stoneville, Mississippi August 23-25, 1949.
Div. Cereal Crops Dis. Bur. Pl. Indust. Soils, Agric. Engin. Beltsville, Md. 1949 : Pp. 27. (Mimeographed).

Maize breeding in general
The problems discussed included: breeding for niacin content in Tennessee; day length studies in crosses between teosinte and maize, local varieties as sources of new inbreds, and the use of male sterility in hybrid production in Texas; gamete selection in Missouri; the use of Florida varieties to contribute lateness to Corn Belt material; the development of new lines in Florida; the breeding work started in Puerto Rico where about 150 lines have been tested in crosses with Mayorbella, and late southern inbreds are being introduced into the breeding programme; work in South Carolina including selection for resistance to lodging and top firing; tests of reciprocal crosses and of inbreds and their test crosses, and comparisons of pollinating methods and of testing methods at Athens, Georgia; yield tests of S_1 lines and their test crosses and work at North Carolina on quantitative characters

including grain yields; the improvement of C317 in Virginia by using recovered strains; the development of inbred lines and of the multiple hybrid of Tennessee 10 and Florida W1 at Experiment, Georgia, where a sweet corn programme is also in progress; the development of new lines in Louisiana; recurrent selection, especially for specific combining ability, in Florida; testing and breeding in Kentucky, where the male sterility of 33–16 has been shown to be cytoplasmically inherited; and breeding at Tifton, Georgia, the main emphasis being on selection for shorter plants and breeding for disease resistance.

Designation of hybrids

The designation of new hybrids was discussed. The names Dixie 22 and Dixie 33 have been assigned to Tennessee Experimental Hybrid, T6013 (T202 x T204) x (NC7 x CI21), and Tennessee Experimental Hybrid T7112 (T13 x T61) x (T101 x T105), respectively, notes on which are provided, including their performance in comparison with other hybrids.

Preservation of germplasm

P. H. Harvey mentioned the need for preserving some of the open-pollinated varieties common to the south. The preservation of local varieties and of inbreds was also discussed.

Disease resistance

In a discussion on maize diseases, L. M. Josephson of Kentucky referred to his smut resistance tests. Later maturing lines seem more resistant to Stewart's disease than earlier maturing ones; in general, lines resistant to this disease are also resistant to *Helminthosporium turcicum*, correlations being in the neighbourhood of 0·8. The development of lines resistant to *Gibberella* root rot is being attempted in Kentucky, where the breeding programme is also concerned with resistance to ear rots. At the Plant Industry Station, Beltsville, L97 continues to be the inbred line most resistant to *H. turcicum*; resistance is being transferred to several Corn Belt lines. A major part of the Beltsville programme is concerned with the inheritance of disease resistance. H. Freeman conducted inoculation experiments in Georgia with *H. Maydis*. In Mississippi, where *Physoderma* is becoming very important, L87 continues to be highly resistant. A strain of NC37 resistant to *H. carbonum* is being developed by P. H. Harvey; two back crosses have been made and a number of related strains are available for testing.

Insect resistance

W. A. Douglas led a discussion on insect resistance in maize. L503 is still considered the most earworm resistant line in Mississippi. For protection against weevils, good husk coverage seems to be the main requirement.

274. Stringfield, G. H.
Report of the Fifth Northeastern Corn Improvement Conference, Brookhaven National Laboratory, Upton, Long Island September 29-30, 1949.
Div. Cereal Crops Dis. Bur. Pl. Indust. Soils, Agric. Engin. Beltsville, Md. 1949 : Pp. 10. (Mimeographed).

The papers presented included a review of maize breeding work by R. Singleton, a talk on gene mutation as a phenomenon for studying the nature of the gene by L. J. Stadler, an outline by L. Nims of the organization and research at the Brookhaven National Laboratory, a discussion by H. L. Everett of his work on the inheritance of chlorophyll, in which he has found at least three genes to be involved, and a discussion on the male sterility character by D. F. Jones. Genetic male sterility in maize is rather variable and seldom complete. Cytoplasmic male sterility appears more dependable and is fixed in three generations of back-crossing. Some inbreds are easily sterilized; others are very difficult. Fertility may be restored in a double cross hybrid either by mixing seed produced from a male sterile female in the female parent with normally produced seed or by developing male lines that will restore it.
Data from tests of sweet corn hybrids and inbreds are presented.

275. 5a Reunión Técnica sobre el Maíz. (**5th Technical Reunion on Maize**).
Inform. Invest. Agríc. (IDIA), B. Aires 1950 : **2** : No. 32 : 4–7.

Genetics
Two papers were presented, the first entitled "Lycopene in the maize grain, a new sublethal recessive monogenic mutation," and the second a plan for conserving the genetic variability of Argentine maize populations.

Plant diseases and pests
Varietal susceptibility to *Sclerotium bataticola* was described, and the need of breeding maizes resistant to drought and frost was emphasized.

Breeding
The topics discussed included heterosis, the use of local populations, the registration of varieties and hybrids, combining ability, drought resistance, synthetic varieties, bitter maize resistant to locust attack, and maize for green ear production or industrial purposes.

Behaviour of varieties
Varietal tests in Argentina and Uruguay were reported.

276. Grobman, A.
Variedades sintéticas: su importancia en el mejoramiento del maíz y evaluación de los métodos propuestos para su formación. (**Synthetic varieties: their importance in maize improvement and evaluation of the methods proposed for their formation**).
Agronomía, Lima 1950 : **15** : 11–24.

Data on different types of synthetic hybrids available in published reports from the USA and elsewhere are reviewed in Spanish. It is desirable that some method of improvement less laborious, expensive and time consuming than the production of inbred lines should be available for countries where the market value of the maize crop is not high.

277. Boceta, V.
Siete años de trabajos selectivos en maíces. (**Seven years of breeding work in maize**).
Bol. Inst. Nac. Invest. Agron. Madr. 1950 : **10** : 107–57.

The maize section of the Instituto Nacional de Investigaciones Agronómicas [National Institute of Agronomic Research], Madrid, has been making observations during the last seven years on 59 American, 29 European and 68 Spanish maize varieties. The importance of the local varieties, which are adapted to the environment, is emphasized, and it is urged that these should ultimately be used as material for the production of hybrids, rather than hybrids introduced indiscriminately from abroad. A catalogue of the local varieties, embodying full details of their characteristics, is being maintained.
Some 500 selfed lines are already under observation. Some of these will be used for reconstituting the most useful varieties, by crossing different inbred lines selected from within the respective varieties, and others for crossing among themselves for the production of hybrids.
In the interval required for the production of pure lines and hybrids, some practical improvement in the local varieties has been effected by the method of crossing consanguineous lines. Some 200 plants of the variety to be treated are sown, the best 30 or 40 plants are selected and their male and female inflorescences are bagged. Reciprocal crosses are made between the best plants as they flower, the date of flowering being noted on the label. The next year 200 plants from each of the selected crosses are sown in two replications and the operation is repeated, the best 30–40 pairs being selected in each replication. The

seeds from the best pairs as regards form, colour and earliness are mixed and in this way an increase of 20 to 40% in yield, combined with greater earliness and uniformity, is obtained. Some of the crosses between different varieties bred in this way have shown marked heterosis and given yields corresponding to 60 quintals per hectare in the Castile tableland. Out of 200 such combinations, 5 exceeded the parents by 50% in yield in three consecutive years, and at least 3 of them have given results equal to the best group of American double cross hybrids.
A special method of effecting artificial pollinations which is preferred to the common method is described. The tassel is isolated with a stout bag and when the right moment for pollination has arrived, the tassel is cut off from the plant, pollen already shed is shaken out and the bag, with the tassel inside, is placed over the ear to be pollinated. The method minimizes the risk of entry of foreign pollen, is quicker and gives a higher seed set than the common method.

278. Jones, D. F. and
Everett, H. L.
Hybrid field corn.
Bull. Conn. Agric. Exp. Sta. 1949 : No. 532 : Pp. 39.

A survey of work carried out on hybrid maize since 1905 at the Connecticut Agricultural Experiment Station is presented, describing the inbreeding programme, methods of evaluating inbreds for combining ability in single and double crosses, inbreds used in Connecticut hybrids, maturity groups of maize in Connecticut, the hybrids developed, commercial production of hybrid seed, and the possible production of hybrid seed without detasseling by making use of cytoplasmically inherited pollen sterility. The hybrids developed include sweet-dent types for ensilage, the result of hybridizing late dent single crosses as seed parents with the sweet corn inbred C95. It is considered that it will ultimately be possible to make use of cytoplasmically inherited pollen sterility in the commercial production of hybrid seed.

279. Huber, L. L.,
Harrod, J. E. and
Schaaf, H. M.
Pennsylvania corn performance studies, double cross tests, 1949.
Progr. Rep. Penn. Agric. Exp. Sta. 1950 : No. 32 : Pp. 8.

The results of tests on 103 double hybrids in five different areas in Pennsylvania during 1949 are summarized.

280. Wasson, R. A. and
Killgore, A. G.
Louisiana corn. High corn yields for larger profit.
La Agric. Ext. Publ. 1950 : No. 1042 : Pp. 19.

The adaptation and characteristics of hybrids available for planting in Louisiana in 1950 are indicated.

281. Clapp, A. L. and
Tatum, L. A.
Kansas corn tests, 1949.
Bull. Kans. Agric. Exp. Sta. 1950 : No. 342 : Pp. 48.

The results are presented of maize tests in six districts of Kansas in 1949, together with a summary of results obtained in previous years. The characters tabulated for the various

hybrids and varieties tested are yield per acre, percentages of erect plants, stand, dropped ears, moisture and shelling, and the number of ears per cwt.
In the supplement on the European corn borer, varietal reaction is briefly considered, and percentages of infested plants in varieties and hybrids tested in Doniphan County are tabulated. Certain experimental lines in Kansas are known to possess some resistance to the insect.

282. Calzada Benza, J.
Resultados de la experimentación sobre el cultivo del maíz. (**Results of experiments on maize cultivation**).
Circ. Estac. Exp. Agríc. La Molina 1947 : No. 65 : Pp. 16.

Varietal trials of Peruvian maize varieties and hybrids are reported for different parts of Peru. The reports deal with grain yield and green ear production. Two hybrids are mentioned as of special interest: Amarillo [Yellow] LM 1, a high yielding hybrid resistant to *Euxesta annonae* and lodging; and SNA 1920 x 4142, which has yielded well in the Lima valley.

283. Kerle, W. D.
Maize sowing recommendations for 1950. Hybrid strains and open-pollinated varieties.
Agric. Gaz. N.S.W. 1950 : **61** : 399–402.

Maize hybrids and open-pollinated varieties suitable for grain or fodder and silage are recommended for the different districts of New South Wales. Descriptive notes on the recommended hybrids are included.

284. Fenaroli, L.
Il mais ibrido. (**Hybrid maize**).
Pubbl. Staz. Sper. Maiscolt., Bergamo No. 58 : Pp. 30.

This popular illustrated booklet for Italian readers deals briefly with the history of the maize plant and its cultivation; hybrid maize and its production and role in Italian agriculture; research on regional adaptation of hybrid maizes in Italy; and the production of hybrid seed.

285.
L'accroissement des rendements par les maïs hybrides. (**Increasing yields by hybrid maizes**).
Rev. Agric. Maurice 1950 : **29** : 77–78.

Hybrid maizes are recommended for cultivation in Mauritius and the American double-cross method of obtaining crops exhibiting high yields as a consequence of heterosis is described.

286. Rogers, J. S.
The inheritance of photoperiodic response and tillering in maize-teosinte hybrids.
Genetics 1950 : **35** : 513–40.

Six teosinte strains from different locations in Mexico and Guatemala were crossed with a multiple tester maize stock carrying marker genes on nine of the ten chromosomes. The segregation of the marker genes and inheritance of photoperiodic response and tillering are described. Linkage relations are also indicated.

The weak photoperiodic response of the maize parent was almost completely dominant in crosses with the three Mexican teosintes but crosses with the more strongly reacting Guatemalan teosintes showed an intermediate type of behaviour indicating incomplete dominance. The results of back crosses involving Guatemalan varieties suggested that genes for time of flowering in each species were strongly favoured by modifiers of their own genetic complex.
Several genes are responsible for the photoperiodic response of each of the teosinte varieties and at least some of them are found on the same chromosomes, particularly 8 and 10.
Photoperiodic response in teosinte as well as in maize is related to geographical origin. Thus it seems likely that the introgression of maize germplasm is important in determining the photoperiodic response of the teosinte varieties.
Number of tillers is largely controlled by genes on the same chromosomes of different varieties, indicating a similar source of genes. Their effect in the Mexican teosintes seems to have been weakened by the introgression of maize germplasm.
Tillering habit and photoperiodic response showed no definite relationship.

287. Rogers, J. S.
The inheritance of inflorescence characters in maize-teosinte hybrids.
Genetics 1950 : **35** : 541–58.

An account is given of the inheritance of inflorescence characters in the material referred to in Abst. 286. None of these characters showed simple Mendelian inheritance. The teosinte parent had a pronounced effect on the proportion of teosinte-like segregates in all the segregating populations. Linkage studies indicate that most of the ten chromosomes may carry genes affecting ear characters, the position of these genes varying from one teosinte variety to another; such genes are present on chromosome 4 of all varieties except possibly El Valle and on chromosomes 1 and 3 of most varieties. Genes determining the teosinte type of pistillate spike occur on most of the chromosomes of El Valle teosinte, but on only a few chromosomes in the other varieties of teosinte. These genes or groups of genes tend to have similar effects.

288. Grillot, G.
Premiers travaux d'amélioration du maïs au Maroc. (**Preliminary work on maize improvement in Morocco**).
C.R. Acad. Agric. Fr. 1950 : **36** : 203–09.

A further report on the work already reviewed (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1767) is given.
Trials of F_1 hybrids from Microsperma x Cinquantini and other intervarietal crosses are proceeding. Pure lines of various Moroccan and foreign populations are being gradually established. Local types well adapted to the region are also being crossed with strains isolated from maize imported from Canada, the USA and Argentina. A few of these hybrids are provisionally mentioned as promising.

289. Whaley, W. G.
The growth of inbred and hybrid maize.
Growth 1950 : **14** : 123–54.

A comparative study of the growth of inbred and hybrid maize forms showed that hybrid vigour was associated with the early attainment of rates of increase in fresh and dry weight higher than those of the inbred parents. No relation was discovered between hybrid vigour and embryo size.

290. Jenkins, M. T.,
Watkins, W. P.,
Ferguson, C. E. and
Eckhardt, R. C.
Hybrid maize (corn) in European countries.
Organisation for European Economic Cooperation, Paris 1950 : Pp. 68.

The report presents the findings of American specialists who conducted enquiries in various European countries from September 1949 to January 1950 and their recommendations for the improvement of hybrid maize production. The countries visited were Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Portugal, Switzerland and Turkey. Tests of American hybrids have been carried out since 1947.
It was considered that maize production in all these countries would be materially increased, probably by about 25%, if open-pollinated varieties were replaced by adapted hybrids. In some areas the increases might approach 50%. Adequate research should be carried out to determine suitable hybrids for the various growing conditions. A possible way of lowering the cost of seed would be by the use of synthetic varieties. Present American hybrids are to be regarded as only temporary expedients; the best maize hybrids for Europe must eventually be bred locally.
It is suggested that one of the good American dent single crosses would be suitable for use as a tester. Since a higher percentage of good inbreds is obtained from hybrid material than from open-pollinated varieties in the USA, it is suggested that at least some of the new inbreds be developed from hybrids, starting with those hybrids which have done well in local tests.
The need for international cooperation is stressed, and the work of FAO and other organizations in this connexion is outlined.

291. Fenaroli, L.
Coltura del mais. (**Maize cultivation**).
Vie d'Italia 1950 : No. 7 : Pp. 5.

This is a popular article explaining to the Italian farmer the advantages of hybrid maize and how it is produced.

292. Brieger, F. G.
The genetic basis of heterosis in maize.
Genetics 1950 : **35** : 420–45.

Hypotheses on the genetic basis of heterosis are examined. Up to the present time the phenomenon of heterosis in maize has been explained mainly by one of two hypotheses: the theory of dominance of favourable genes and that of heterozygosis. It is considered that the well-known hypothesis of linked dominant factors advanced by Jones occupies an intermediate position between the above two theories. If linkage between dominant and recessive genes became so close that practically no crossing-over occurred, it would be difficult to distinguish experimentally between the linkage and the heterozygosis theory; heterozygosis of chromosome regions instead of that of simple genes would be under consideration; if on the other hand linkage were rather weak the difference between the simple dominance and the linkage hypothesis would practically disappear.
The view is expressed that the evidence presented in the literature provides no conclusive proof in favour of either of the main hypotheses.
It is suggested that comparison of hybrids with their parents will not always give a reliable criterion for the recognition of heterosis, and that the term should be applied when the mean of the hybrids for any quantitative character is higher than that of the progeny obtained by any form of inbreeding; hybrids heterotic in this sense may be superior, equal

or inferior to their own parents. It is further suggested that heterosis does not affect an individual plant as a whole but only its separate characters.

By application of the principles of population genetics to the problem of the evolution of genic systems which result in heterotic effects, the conclusion is reached that there exists no effective breeding system tending to accumulate a sufficient number of recessive subviable or lethal mutants, as required by the hypothesis of dominance of favourable alleles. It is argued, however, that a rapid accumulation of mutations, i.e. genes causing heterozygous loci to have a higher survival value than either the original normal genes or new subviable mutations, will occur. Using the number of heterozygous loci present in a population as a measure for the efficiency of a genic system, it is evident that heterotic gene systems are considerably superior to systems based on recessive subviable or lethal mutations. In order to accumulate an average of 100 heterozygous loci per individual in a population it is calculated that the following numbers of loci are required: (1) from 100 to 200 mutable loci for the production of mutations to heterotic gene pairs; (2) 5000 loci which may mutate at a rate of 10^{-5} to recessive subviable genes with survival values of the high order of 0·9; or (3) over 15,000 loci which may mutate at a rate of 10^{-5} to lethal mutant genes. In addition, facts are cited to show that the hypothesis of dominant genes does not provide a satisfactory explanation of all the results obtained by inbreeding, and it is considered that the theory of heterotic gene interaction forms an adequate basis for interpreting data concerning inbreeding. Further support for the theory of heterotic gene interaction is drawn from the fact that inbred lines possess residual heterozygosity, the existence of balanced heterotic populations in indigenous South American maize, and the proven possibility of obtaining such balanced populations by breeding.

The procedure of maize breeding is briefly discussed in the light of the hypothesis of heterotic gene interaction. The view is expressed that the method of hybrid breeding has given excellent results in the United States but that the results obtained by this method elsewhere are much less satisfactory. In hybrid production the basic technique is the selection of lines which can stand a good deal of inbreeding, and which therefore have high values for the survival index of homozygotes; thus the basic genetic element which makes possible the establishment of a balanced heterotic population is intentionally eliminated. It is however suggested that the hybrid technique may not give equally good results in other countries, where local or indigenous populations exist, containing a large number of genes with a low survival index when homozygous. The production of new and improved balanced populations may have practical value, at least in South and Central America.

The following breeding procedure is outlined for the establishment of balanced heterotic populations. Inbreeding is pursued for three generations in order to eliminate undesirable recessive characters and to increase homogeneity of non-heterotic loci. During this inbreeding phase preference should be given to lines which are less resistant to inbreeding. In the second phase of breeding, repeated and multiple crosses are carried out, all lines with low combining ability being eliminated. After another period of about three generations of continued crossing and selection, the remaining multiple hybrids are bulked to form one breeding unit.

293. STRINGFIELD, G. H.
Heterozygosis and hybrid vigor in maize.
Agron. J. 1950 : **42** : 145–52.

Experiments were carried out to study the effect of measured degrees of heterozygosis upon hybrid vigour. Four inbred lines of maize were combined into crosses so that the lines contributed in equal ratios to different degrees of heterozygosis. The following forms of crosses were investigated: (1) crosses with no heterozygosis, in the form of sibling x sibling matings within lines; (2) F_2 single crosses and back crosses, with 50% heterozygosis; (3) crosses of the type (A x B) (A x C) having 75% heterozygosis; and (4) crosses of 100% heterozygosis represented by the F_1 generations of single crosses, three-way crosses and double crosses. Vigour was measured by grain yield, time of silking, and height of the ear-bearing node. The data showed that neither time of silking nor height of ear-bearing node is inherited as a dominant character in its total effect.

Back crosses give significantly higher yields than the F_2 generations, and single and three-way crosses produced higher yields than the double crosses of group (4); predictions of double cross yields based on yields of non-parental single crosses may thus be too high. On the whole the data indicate that the expression of plant vigour as a function of added and equal proportions of heterozygosis is arithmetic rather then geometric, but at a decreasing rate at least in the range between an F_2 and F_1 single cross. This diminishing return of vigour may explain the greater vigour found in the back crosses compared with the F_2 generations; the back crosses have a more even distribution of dominant genes at a dosage of higher average efficiency. This explanation could also be applied to elucidate the greater vigour of single and three way crosses in comparison with double crosses. Alternatively, the superiority in vigour of the back crosses over F_2 generations and of single and three way crosses over double crosses might be explained on the basis that the more vigorous cross carries intact the genes of a selected inbred. Lines which survive the procedure of selection may tend to have favourable combinations of genes; a favourable combination might contribute more vigour than a random assortment intrinsically just as favourable. The F_1 crosses give approximately twice the grain yields of their parent inbred lines; this large difference is still unexplained. Arguments are made against the assumption that this difference arises from (1) the cumulative contribution of dominants having small effect relative to their recessive or hypostatic alleles; (2) strong interaction between non-allelic dominants; and (3) heterozygosis.

294. Sprague, G. F. and
Miller, P. A.
A suggestion for evaluating current concepts of the genetic mechanism of heterosis in corn.
Agron. J. 1950 : **42** : 161–62.

One of the chief theories on heterosis assumes that the phenomenon is due to the action of favourable dominant genes; another hypothesis is based upon the view that overdominance is the main cause of heterosis. Information on the relative importance of these two types of gene action is needed as a guide for appropriate testing procedures of general and specific combining ability. Procedures of recurrent selection are outlined which should provide some measure of the relative importance of the two types of gene action.

295. Hull, F. H.
Plant breeding in relation to soil fertility and climate.
Proc. Soil Sci. Soc. Fla. 1945 (1946) : **7** : 23–29.

Crop breeding is discussed in relation to soil fertility, chiefly with reference to hybrid maize. Attention is drawn to the fact that the expected increase in the yield of hybrid maize has not been realized with the use of a new cycle of inbred lines derived from crosses of the best lines of the original cycle. One possible explanation of this apparent halt in the progress of developing still higher yielding hybrid maize may be that breeding work has been based on a misconception of the nature of hybrid vigour. The view is expressed that if hybridity is accepted as fundamental to a high degree of vigour and yield in maize, certain anomalies encountered in maize breeding can be explained. It is therefore suggested that maize breeding should be directed towards securing the greatest degree of hybridity rather than the greatest possible concentration of favourable factors, and that use should be made of the multiplicative genetical effect in recurrent selection.

296. Méneret.
Amélioration de la production du maïs en Bresse. (**Improvement of the yield of maize in the Bresse region**).
C.R. Acad. Agric. Fr. 1950 : **36** : 331–33.

American maize hybrids were compared with local out-pollinated varieties. Results showed that the use of hybrids such as Wisconsin 255 could produce an increase of 25–30% in grain production in Bresse.

297. JUNGFLEISCH, M.
Le maïs en Égypte. **(Maize in Egypt).**
Bull. Un. Agric. Égypte 1949 : **47** : 109–15, 136–45.

Two sections of interest to breeders in this paper deal with the origin and varieties of maize and with the varieties grown in Egypt. Nab el Gamal is the most widely cultivated at present. It is probably of American origin as it closely resembles Hickory King. Selection of existing varieties in Egypt for earliness and yield would probably be more successful than selection of varieties imported more or less at random.

298. WEATHERWAX, P.
The history of corn.
Sci. Mon. N.Y. 1950 : **71** : 50–60.

A general discussion is presented of the origin of maize and of its relationships with other grasses. The author is sceptical about the suggestion made by Stonor and Anderson that maize may be Asiatic in origin.

299.
Correspondence.
Sci. Amer. 1950 : **183** : No. 3 : 2–6.

Zelinsky, W. (*p. 2*).

The author contests what he refers to as Mangelsdorf's assumption (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2297) that the subject of pre-Columbian Old World maize is closed. Arguments for the existence of maize in Asia long before the time of Columbus are put forward and, in view of the fact that maize has many more botanical relatives among the Old World than among the New World grasses, it is suggested that maize may have originated in Asia.

Mangelsdorf, P. C. (*pp. 2–6*).

The author denies having made the assumption attributed to him by Zelinsky, but is sceptical about the latter's arguments, which he briefly discusses. He considers the statement that maize has many more possible relatives among the Old World than among the New World grasses to be irrelevant because it is the closeness of the relationship, not the number of relatives, which counts. The Old World relatives of maize differ from it profoundly and have never been successfully hybridized with maize. The author maintains that there is no real evidence of any kind for the existence of maize in the Old World before 1492.

Baily, J. L. (Jun.). (*p. 6*).

The writer supports Mangelsdorf's conclusion, that maize originated in the Andean region, because of the early occurrence of domesticated llamas in the Peruvian Andes. It would seem that agriculture was first undertaken to provide fodder for domesticated herds and it appears reasonable therefore to suppose that the original development of corn would be accomplished by those Indians who had already acquired herds of domesticated animals.

300. VACHHANI, M. V.
A study of the relationship of chromosome knobs with certain agronomic and morphologic characters in corn inbreds.
Agron. J. 1950 : 196–201.

Chromosome knob counts in 20 maize inbreds of diverse origin showed a range of numbers from 2 to 8, most of the lines having from 3 to 6, with a mean of 4·65. No definite relationships were established between chromosome knob numbers and plant characters.

301. Burnham, C. R.
Chromosome segregation in translocations involving chromosome 6 in maize.
Genetics 1950 : **35** : 446–81.

A study was made of chromosome segregation in 27 translocations with breakages at different loci in chromosome 6, which carries a nucleolar organizer. Certain segregations can be recognized by the nucleolar constitution of the microspore quartets, or by differences between predicted and observed pollen abortion, while in translocations involving the short arm of chromosome 6, crossing over in the interstitial segments results in a distinctive type of quartet. The following relationships between crossing over and chromosome segregation in translocation heterozygotes were found. In rings, low cross over frequency associated with short interstitial segments was accompanied by a high frequency of adjacent 2 chromosomes. In 2–2 segregations from the complex of four chromosomes, homologous centromeres pass to the same pole, such a type of segregation being termed adjacent 2 by McClintock. In the case of high frequency of cross overs, associated with long segments, few or no adjacent 2 chromosomes were observed. Thus when chromosomes cross over in the interstitial segment they pass to opposite poles; the adjacent 2 type of segregation occurs only when no crossing-over has taken place. In chains little or no adjacent 2 segregation was recorded in any of the translocations, however short the interstitial segment. The relative length of the two axes was found to be a factor influencing segregation; the chromosome segregations were similar whether the centromeres were on the shorter or the longer axis.
The literature on chromosome segregation in *Drosophila*, *Oenothera* and other plants is reviewed. It is suggested that cases of directed segregation in translocation heterozygotes may be genetically controlled, the amount of spore abortion depending upon the frequency of crossing over in the interstitial segment. Genetic recombination in such cases may be greatly reduced, since single cross overs and certain of the multiple ones are not recovered following alternate segregation. The low frequency of crossing over in translocations in maize, however, cannot entirely be explained on this basis, since no evidence of any considerable amount of directed segregation has been obtained; a search for genes which may bring about directed segregation is being made in crosses between maize of different origins and a tester translocation with short interstitial segments.

302. Hansen, J. R. and
Buchholtz, K. P.
Germination and seedling responses of inbred lines of corn to 2,4-dichlorophenoxyacetic acid.
Agron. J. 1950 : **42** : 452–55.

The responses of 59 inbreds to 2,4-D varied, only a few being resistant.

303. Jones, D. F.
The interrelation of plasmagenes and chromogenes in pollen production in maize.
Genetics 1950 : **35** : 507–12.

In maize and other plants, pollen abortion is brought about by recessive chromosomal genes and also by extra-nuclear factors presumably propagated and transmitted in the cytoplasm. The action of these two kinds of hereditary factors is discussed. Plasmagenes conditioning pollen sterility appear to have no other effect upon the growth and structure of the plants. Plasmagenes and chromogenes for pollen sterility when present in the same plant seem to act independently, but other chromogenes can restore pollen production in variable amounts in plants which would otherwise show complete cytoplasmic sterility. The pollen produced by partially fertile plants with the plasmagene for sterility is less effective than normal pollen when in competition.

304. Miller, R. C.,
Aurand, L. W. and
Flach, W. R.
Amino acids in high and low protein corn.
Nature, Lond. 1950 : **112** : 57–58.

An analysis was made of the lysine, tryptophane and methionine contents of nine different single crosses between inbred lines of yellow dent maize. The results indicated that the distribution of the three aminoacids was approximately the same for single crosses with high or low crude protein contents, and that the quality of the protein was not changed with increases in the amount of protein within the range from 8·48 to 14·12%.

305. Buchinger, A.
Ungewöhnliche Zuchtziele. (**Unusual aims in breeding**).
Pflug, Wien 1950 : **3** : No. 3 : 1–2.

In the USA some varieties of maize having a thick cob are bred for use in the manufacture of tobacco pipes. Some Austrian varieties, e.g. Marchfeld, which have extremely thick cobs and so less grain, have attracted American interest.
Partial infertility of rye is desirable when the plant is grown to obtain ergot. In this connexion experiments are described which the author made with fully grown plants of polyploid rye. They were only partially fertile and, as anticipated, the prolonged full bloom of the infertile flowers favoured the production of ergot. The breeding of polyploid rye for high partial sterility is suggested as a method of obtaining this drug.

306. Leng, E. R.,
Curtis, J. J. and
Shekleton, M. C.
Niacin content of waxy, sugary, and dent F_2 segregating kernels in corn.
Science 1950 : **111** : 665–66.

Niacin content was analysed in waxy, sugary and dent kernels segregating in the F_2 of a maize cross between a line with sugary endosperm and high niacin content and a line with waxy endosperm and low niacin content. Dent kernels were lowest, waxy kernels intermediate and sugary kernels highest in niacin content. With the information at present available, the apparent relationship between endosperm type and niacin content cannot be satisfactorily explained. A direct influence of endosperm type on the niacin content of the kernel appears to be a more likely explanation than genetic linkage.

307. Magee, J. A.
A histological study of heterosis in the caryopsis of maize.
Proc. Iowa Acad. Sci. 1947 : **54** : p. 171. (Abst.).

Inbred lines and hybrids of popcorn and dent corn were compared in respect of rate of embryological development. Hybrid vigour was manifested in rate of leaf initiation, radicle differentiation and development of the endosperm. Reciprocal hybrids did not behave similarly with regard to these developmental traits.

308. Scossiroli, R.
Contributo alla conoscenza del mais (*Zea mays*). [**A taxonomic description of maize** (***Zea mays***)].
Suppl. Ann. Sper. Agrar., Roma 1950 : **4** : i–xxxiv.

It is pointed out that a race in any cultivated plant such as maize is a group of individuals all corresponding roughly to a common type and that the expression of any given character

will not be a constant but will fluctuate round a mean value. A statistical study was made of a number of characters in a mass selected Italian maize variety Giallo Tondo San Pancrazio [S. Pancrazio Round Yellow] and their frequency distributions are reported. The value of the various characters for diagnostic purposes is discussed and a table is presented showing their mean values, standard deviation and coefficient of variation.

309. STANDLEY, P. C.
Téosinte du Honduras. (**Teosinte from Honduras**).
Rev. Bot. Appl. 1950 : **30** : 331–33.

Recent views are set out on the identity of teosinte, its botanical classification, its resemblance to maize, and its occurrence in various parts of Central America, and Honduras in particular.

310. RAMELLA, R.
Investigación maicera en la provincia de Jujuy. (**Study of maize in the Jujuy province**).
"Granos" Semilla Selecta, B. Aires 1948 : **12** : Nos. 7, 8 and 9 : 3–41.

A study of the maize crop in the Jujuy province of Argentina showed the presence of an exceptional range of varieties and forms, representing *Zea Mays* vars *indentata, indurata, amylacea, saccharata* and *everta*. The work of previous investigators in describing these forms and the genes they bear is analysed. The greatest diversity is found in the Humahuaca valley.
General recommendations are made for the improvement of maize cultivation in the province.

311. BUCHINGER, A.
Verhalten verschiedener Maissorten gegen verschiedene Schädigungen. (**Behaviour of different varieties of maize towards different kinds of damage**).
Pflug, Wien 1950 : **3** : No. 2 : Pp. 6.

The results are shown of tests, made throughout Austria, of the resistance of varieties of different types of maize to pests during storing and in the field, and to diseases caused by fungi. Varietal behaviour under conditions of drought and storage is also described. American and Austrian varieties were used.

312. ULLSTRUP, A. J.
Diseases of dent corn in Indiana.
Circ. Ind. Agric. Exp. Sta. 1950 : No. 359 : Pp. 27.

Some information on the reaction of commercial inbred lines of dent maize to *Diplodia* root rot and other diseases is included.

313. REEVES, R. G.
The use of teosinte in the improvement of corn inbreds.
Agron. J. 1950 : **42** : 248–51.

Several maize inbreds have been crossed with teosinte at the Texas Agricultural Experiment Station; the results of crossing two of these inbreds, 4R–3 and 127C, are described in the present paper. Two varieties of teosinte were used as parents, the so called variety

Florida, originally from Guatemala, and Nobogame, a Mexican variety. The hybrids between the inbreds and teosinte were back-crossed to the maize inbreds varying numbers of times. One small group of F_1 plants from the cross 4R–3 x Nobogame was however repeatedly selfed. The hybrid derivatives were tested for heat tolerance in comparison with the original inbreds by artificial heat treatment in an oven apparatus, and for yield in field plots containing also the original inbreds and a hybrid tester.

The results indicate that teosinte may provide a source of germplasm for the improvement of maize inbreds; whether improvement is secured in the derivatives apparently depends upon (1) the particular inbred, (2) the variety of teosinte, and (3) the proportion of teosinte germplasm imparted to the inbred. The hybrid derivatives from 4R–3 showed increased tolerance of heat but no significant change in yielding ability; in the case of derivatives involving 127C a highly significant increase in yielding ability was found, which may have been partly due to enhanced resistance to heat and drought. Improved yields were only obtained by use of the variety Florida. It is pointed out that the unchanged yielding ability in the case of modified 4R–3, in contrast to the results with 127C, may be ascribed to the fact that in its original form the inbred is more similar to teosinte than 127C. The group of plants from 4R–3 x Nobogame which were selfed gave the lowest yields of all the modified lines of 4R–3, suggesting that too great a proportion of teosinte germplasm, at least of the variety Nobogame, may be detrimental in the case of this inbred.

314. Ferguson, I. A. C.
Hybrid maize. Preliminary disease resistance tests.
Rhod. Agric. J. 1950 : **47** : 229–33.

Previous testing work carried out in the United States on the leaf blight (*Helminthosporium turcicum*) resistance of maize hybrids developed at the Salisbury Experiment Station, Southern Rhodesia, is outlined. A report is given of the results of tests on three double hybrids, seven inbreds and the open-pollinated variety McKerrel's Hickory King for their resistance to leaf blight and cob rots (*Fusarium* and *Diplodia Zeae*), conducted at the Salisbury Station; the inoculation techniques used are described.

315. Painter, R. H. and
Wilbur, D. A.
The European corn borer in Kansas.
Circ. Kans. Agric. Exp. Sta. 1950 : No. 262 : Pp. 13.

Certain experimental lines of maize in Kansas are known to have some resistance to the European corn borer. In other states to the east and north some progress has been made in combining resistant and tolerant inbreds into commercial hybrids.

316. Pinnell, E. L.,
Hayes, H. K.,
Rinke, E. H. and
Holdaway, F. G.
Minhybrid 408 corn stands up well under borer attack in Minnesota.
Crops and Soils 1950 : **2** : No. 9 : p. 31.

The maize hybrid Minhybrid 408 [(Oh51A x Os420) (A73 x A275)] has produced high yields during 1949, a year of severe corn borer attack in Minnesota; its tolerance of the corn borer is ascribed to its high degree of resistance to stalk breakage. The hybrid is however not highly resistant to the feeding of the larvae of the first brood. Breeding work is being carried out to develop hybrids combining tolerance of borers and stalk rot and true resistance to larval feeding and survival.

317. Wilbur, D. A.,
Bryson, H. R. and
Painter, R. H.
Southwestern corn borer in Kansas.
Bull. Kans. Agric. Exp. Sta. 1950 : No. 339 : Pp. 46.

Testing and selecting of maize for resistance to corn borer are reported. It is planned to use material resulting from mass selection for resistance, which was begun in 1946, followed by selection for other desirable characters as a possible source of resistant strains.

318.
Dwarfing of maize in Italy.
F.A.O. European Bull. 1950 : No. 2 : 100–101.

Information on the dwarfing disease of maize in Italy, the cause of which is not yet certain, is reviewed. Local adapted varieties are much more resistant than American hybrids; flint maize has been found to be more resistant than dent.

319. Brétignière, L.
La culture du maïs en France. (**The cultivation of maize in France**).
C.R. Acad. Agric. Fr. 1950 : **36** : p. 318.

The writer briefly describes the stage reached in France's plans for developing the production and cultivation of maize, and especially American hybrid types.

320. Alabouvette and
Rautou.
Les hybrides Américains de maïs dans les régions méridionales en 1949.
(**The American maize hybrids in the southern districts in 1949**).
C.R. Acad. Agric. Fr. 1950 : **36** : 323–27.

Comparative variety trials of hybrid maizes in the Montpellier, Castelnaudary, Ondes, Chalosse regions and other districts have provided some data on the comparative suitability of American hybrids and French varieties for southern France. Resistance to drought, lodging and pest damage was also noted.

321. Cauderon, A.
Essais de culture de maïs-grain dans la région de Paris. (**Cultivation trials of maize for grain in the Paris region**).
C.R. Acad. Agric. Fr. 1950 : **36** : 333–39.

Most of the trials failed owing to drought in 1949, but some results are recorded from Versailles Plant Breeding Station, where American hybrids and a few French varieties were tested. Tillering proved disadvantageous under drought conditions and selection for absence of tillering would appear to be justified. Wisconsin 255 proved best adapted to the district and had already given the best results for the past two years in northern France.

322. Shank, D. B.
1949 South Dakota corn performance tests.
Circ. S. Dak. Agric. Exp. Sta. 1950 : No. 79 : Pp. 14.

The results of tests on maize hybrids and open-pollinated varieties are summarized.

323. Robinson, J. L. and
Hutchcroft, C. D.
The 1949 Iowa corn yield test.
Bull. Ia Agric. Exp. Sta. 1950 : No. P103 : 490–552.

The results of the 1949 test of maize hybrids, carried out by the Iowa Corn and Small Grain Growers' Association in cooperation with the Iowa Agricultural Experiment Station, are presented. All the hybrids were ranked according to a performance score based upon yield, moisture, lodging and dropped ears.

324. Brétignière, L. and
Bouet, P.
Les essais de maïs hybrides Américains à la ferme extérieure de Grignon. (**The trials of American maize hybrids at the outlying Grignon farm**).
C.R. Acad. Agric. Fr. 1950 : **36** : 318–19.

A brief note is given on the material tested, which included Canadian and US selections. Many varieties failed to ripen completely.

325. Schad, C. and
Villax.
Expérimentation du maïs en Limagne. (**Maize experiments in Limagne**).
C.R. Acad. Agric. Fr. 1950 : **36** : 327–31.

These trials in progress in the Limagne region in France were concerned with yield of grain and of forage of American and French varieties of which 22 were hybrids and ten open pollinated. Drought resistance was also observed.
The French variety Blanc de Chalosse was particularly resistant. Among five American hybrids which surpassed Grand Roux Basque in yield, Wisconsin 255 was also outstanding in drought resistance.
The experiments in yield of forage are to be continued to ascertain whether the hybrids and their progenies are in fact superior to the open pollinated varieties.

BARLEY

326. Bohmont, D. W. and
Butler, T. A.
De-awning machine for experimental barley samples.
Agron. J. 1950 : **42** : p. 311.

A machine for removing the awns from threshed barley samples, useful in breeding work, is described.

327. Covas, G.
El prototipo de las cebadas cultivadas. (**The prototype of the cultivated barleys**).
Ciencia e Investigación, B. Aires 1950 : **6** : 236–37.

The author considers it highly improbable that a group of forms cytogenetically so closely related as the cultivated barleys could have arisen polyphyletically. There are good reasons for considering *Hordeum spontaneum* the most ancient form of the section *Crithe*; it possesses two characters regarded as primitive, namely sterile lateral florets, which are dominant in inheritance, and brittle rachis. By a single mutation it could therefore have given rise to *H. agriocrithon*, with six rows, or to *H. distichon*, with tough rachis. Hybridization of these two could have given *H. hexastichon*.

328. VAZART, J.
Nouvelles observations sur les noyaux à calotte. Étude caryologique comparée de *Hordeum vulgare* L., *Capsicum annuum* L., *Pastinaca urens* Req. et *Solanum ovigerum* Dun. (**Additional observations on skull cap nuclei. A comparative caryological study of *H. vulgare* L., *C. annuum* L., *P. urens* Req. and *S. ovigerum* Dun.**).
Rev. Gén. Bot. 1950 : **57** : 517–53.

The author here continues her study of nuclei exhibiting a hemispherical arrangement of the chromatin at interphase, devoting attention mainly to a detailed comparison of the nuclear phenomena accompanying interphase and mitosis in *C. annuum*, *P. urens* and *S. ovigerum* with those already discussed in her study of mitosis in *H. vulgare* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 945). The role of the nucleolus in mitosis is also considered. The writer found the number of nucleoli correlated with the size of the chromosomes and not with the interphase structure of the chromatin.

329. HAGBERG, A. and
HIN TJIO, J.
Cytological localization of the translocation point for the barley mutant *erectoides* 7.
Hereditas, Lund, 1950 : **36** : 487–91.

The gene *erectoides* 7 is closely linked to a translocation point located either on the long arm of chromosome I or the short arm of chromosome V.

330. MALCOLM, J. P.
Classification of barley varieties in New Zealand.
N.Z. J. Sci. Tech. 1949 : **30** : Sect. A : 305–28.

The value of growth, leaf, stem, spike and grain characters in classifying barley varieties cultivated in New Zealand is examined. Varieties are described on the basis of the characters most stable under varying environmental conditions; identification keys are provided.

331. NYBOM, N.
Do X-rays resuscitate heat-killed seeds?
Hereditas, Lund 1950 : **36** : 516–17.

The effects on barley germination of heat alone, heat plus X-rays and X-rays alone were studied. X-ray treatment raised the percentage of germination of heat treated seeds from 46% to 80%.

332. TAKAHASHI, R.
(**Studies on the classification and geographical distribution of barley varieties. I. Classification of Japanese barley varieties in respect of the characteristics of the coleoptile**).
Proc. Crop. Sci. Soc. Japan 1944 : **15** : 217–23.

An examination of an extensive collection of Japanese barley varieties has shown that these can be classified into two categories, those with coleoptiles shorter than 37 mm. (mode 25–30 mm.), and those with coleoptiles longer than 37 mm. (mode 49 mm.). In general, the parts of the varieties with the shorter coleoptile are also shorter and sometimes thicker. Grain thickness and vegetative period, however, are not correlated with coleoptile length. It is believed that the short coleoptile barleys correspond to *Hordeum hexastichum* var. *brachyatherum*.

333. TAKAHASHI, R.
(Studies on the classification and geographical distribution of barley varieties. II. On the classification of Japanese barleys in respect of the type of ear).
Proc. Crop Sci. Soc. Japan 1944 : **15** : 224–32.

Data are presented in graphical form on the distribution of the mean length between the articulations of the spike, the length of the spike, and the length of the awns among varieties falling into the two systematic categories distinguished by the author on the basis of coleoptile length (cf. Abst. 332).

334. TILT, J.
Malting barley—varieties and quality.
Tasm. J. Agric. 1950 : **21** : 177–83.

The characteristics and performance of Plumage Archer, Golden Archer and other barleys are discussed, as a result of variety trials carried out in Tasmania.

335. HUNTER, H.
Review of the improvement of malting barley in the British Isles.
Wallerstein Laboratories Communications 1950 : **13** : 201–22.

A comprehensive and well-illustrated review of the improvement of malting barley in the British Isles is presented.

336. GUSTAFSSON, Å.,
NYBOM, N. and
WETTSTEIN, U.
Chlorophyll factors and heterosis in barley.
Hereditas, Lund 1950 : **36** : 383–92.

The three chlorophyll deficient mutants *albina* 7, *xantha* 3 and *alboxantha* give rise to more productive plants in the heterozygous condition than the normal homozygotes, when dense sowings with heavy applications of fertilizers are compared. Under conditions of sparse sowing and little manure, the heterozygotes are less productive than the normal homozygotes. The lethal genes are recessive in respect of their morphological effects; in respect of vigour in dense highly manured stands they may be described as superrecessive; in sparse poorly fertilized stands they are semidominant.

337.
It's 'heads up' barley!
Sth. Seedsman 1950 : **13** : No. 9 : p. 18.

The winter barley Harbine, a six-rowed type selected at the Oklahoma Agricultural Experiment Station, possesses outstanding resistance to lodging and is thus especially suitable for combine harvesting. It has high test weight and threshes relatively free from beards. In preliminary tests it has shown considerable resistance to leaf rust and smuts. Under conditions in Oklahoma the variety is medium early.

338. O'KELLY, J. F.
Barley adapted to two sections of state.
Miss. Fm Res. 1949 : **12** : No. 10 : p. 7.

Varietal yields of barley for 1947, 1948 and 1949 are tabulated, maturity dates and awn types being also indicated.

339. **Report of the Seed Propagation Division, 1948.**
J. Dep. Agric. Éire 1949 : **46** : 149–66.

The work of the Seed Propagation Division included the breeding, selection and propagation of new barleys and the testing of barley varieties. A small scale variety test comprised seven new selections from the Cereal Station, a new selection of Abed, Rigel and the standard Spratt-Archer 37 No. 3; none of the selections were superior to Spratt-Archer 37 No. 3. In one of two drill strip experiments, Ymer, Binder, Kenia x Spratt-Archer x Kenia 6/3 No. 5 and Spratt-Archer x Kenia 17 were tested; Ymer gave significantly higher yields than any of the other three varieties. In the second drill strip experiment the new hybrid selections Spratt-Archer x Archer 14 and Spratt-Archer x Archer 20 were tested against Spratt-Archer 37 No. 3, both hybrids were significantly superior to the control in yield and showed promising malting quality. The large scale barley trial carried out at 10 centres comprised Spratt-Archer 37 No. 3, Hume's Archer 1, Binder and Balder. Binder was significantly superior in yield to both Hume's Archer 1 and Spratt-Archer 37 No. 3; there was no significant difference between Balder and any of the other varieties.

MILLETS AND SORGHUM

340. Krishnaswamy, N.,
Raman, V. S. and
Hrishikesan Nair, N.
An autotetraploid in the pearl millet.
Curr. Sci. 1950 : **19** : 252–53.

Treatment of seeds and seedlings of *Pennisetum typhoides* with colchicine in aqueous solution or lanolin emulsion failed to produce any affected adult plants. One autotetraploid ($2n = 28$) was secured by introducing an aqueous colchicine solution into the tissues under reduced pressure. Pollen mother cell divisions were found to be regular.

341. Takahasi, N.
(On the flowering of Italian millet and its artificial hybridization).
Proc. Crop Sci. Soc. Japan 1941 : **13** : 337–40 [from Jap. J. Bot. 1943 : 12 : Abst. 219].

Strains of *Setaria italica* were successfully crossed by tying together a spike from each strain, covering them with a bag of paraffin paper or cellophane and leaving them for about a month, until the end of flowering. By this procedure the majority of the flowers were selfed but a proportion of hybrids was obtained.

342. Kihara, H. and
Kishimoto, E.
(Hybrids between *Setaria italica* and *S. viridis*).
Bot. Mag. Tokyo 1942 : **56** : 62–67 [from Jap. J. Bot. 1943 : 12 : Abst. 152].

The cross *S. italica* x *S. viridis* was fairly easily made. The F_1 plants differed little from *S. viridis* except for ear length, grain size, and number of grains per ear, all of which were intermediate between the parents. The PMC of the F_1 contained 9_{II} chromosomes; pollen grains were well developed and fertility was complete. *S. italica* has either a starchy or a glutinous endosperm like that in *S. viridis*.
The ratio of starchy to non-starchy type in the pollen grains and endosperms is discussed. The writers conclude that *S. viridis* is probably the wild ancestral form of *S. italica*.

343. KARPER, R. E. and
JONES, P. A.
The sorghums are coming!
Sth. Seedsman 1950 : **13** : No. 9 : 13, 49, 53.

The new sorghum varieties Combine Kafir 60, Redbine 60 and Redbine 66, developed at the Texas Agricultural Experiment Station, are especially suitable for combine harvesting. Combine Kafir 60, produced by crossing a double dwarf selection of Kafir with Texas Blackhul and back-crossing several times to the Kafir parent, shows promise for the production of industrial starch and oil; it is white seeded and earlier maturing than Texas Blackhul or Plainsman. Redbine 60 and Redbine 66 are red seeded varieties, similar except in their maturity; Redbine 60 blooms in 60 days, a little earlier than Martin; Redbine 66 blooms in 66 days, somewhat earlier than Plainsman.

344. HANSING, E. D.,
MELCHERS, L. E. and
BATES, J. C.
Weak neck of sorghum.
Agron. J. 1950 : **42** : 437–41.

Varietal differences in susceptibility to weak neck are noted. It is suggested that the best method of controlling weak neck in milos is by breeding combine varieties with inherent peduncle characters similar to those of the kafirs.

345. COTTE, A.
Essais de sorghos en 1949. (**Trials of sorghums in 1949**).
Progr. Agric. Vitic. 1950 : **67** : 182–86, 227–31, 262–66, 278–81.

This is a detailed report on the experiments with grain sorghums, sweet sorghums and sudan grass already reviewed in *Plant Breeding Abstracts*, Vol. XX, Abst. **1655**.

RICE

346. PIACCO, R.
Studio comparato delle principali razze di riso coltivate in Italia. (**Comparative studies of the main rice varieties cultivated in Italy**).
Risicoltura, Vercelli 1950 : **38** : 170–73.

In continuation of previous studies (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2247), data are given for the seasons 1947, 1948 and 1949.

347. LUDOLF, A. de M.
Cultura do arroz. (**The cultivation of rice**).
Ministério da Agricultura, Rio de Janeiro 1949 : Pp. 57.

Descriptions are included of the more widely grown Brazilian varieties.

348.
Annual Report of the Central Rice Research Institute, Cuttack 1948-49 (1950) : Pp. 44.

Study of the world rice collection, comprising genetic strains, wild species and improved Indian varieties, continued.
In three families derived from a natural cross believed to have occurred between cultivated rice and *Oryza sativa* var. *fatua*, shattering of the grain was dominant to non-shattering and

dependent upon a single gene, and apiculus pigmentation was determined by two complementary genes.
Genetic variability and the value of secondary selection in established strains were analysed. Study of the inheritance of pigmentation in several plant characters has been begun; inheritance of vivipary, ligule characteristics and leaf habit is also under investigation.
The results of trials of varieties with different maturity periods are summarized. In the trial of hybrid material, three selections outyielded the control, T812, by 19 to 28%. Experiments on plot technique are reported.

349.
Technical cooperation with eastern countries.
Foreign Agric. 1950 : **14** : p. 211.

Among American agricultural experts cooperating with Eastern countries is H. T. Love of Cornell University who is helping in the development of superior varieties of rice in Thailand.

350. Chan Choong, P. A.
Rice Experiment Station.
Rep. Dep. Agric. Brit. Guiana 1947 : 22–28.

Trials of rice varieties carried out at the Rice Experiment Station, British Guiana, are reported. The standard D110 maintained its position as the best drought resistant varieties. The new variety D52–37 was successfully introduced into commercial cultivation on a small scale. Two main facts have emerged from the results of improvement work, begun 15 years ago: selection among local varieties has yielded the best material for commercial cultivation; introductions have not given a satisfactory performance. The possibilities of hybridization are being explored; two of the hybrids so far produced have outyielded D110 by 12·3 and 10·6% respectively; but these have still to attain the stage of successful commercial distribution. Emphasis is now being laid on suitability for mechanical cultivation; in this new project it is expected that introductions will play an important part in hybridization.

351. Piacco, R.
L'Arborio ed il Bersani. (**Arborio and Bersani**).
Ital. Agric. 1950 : **87** : 357–60.

The rice variety Arborio was evolved by a grower of that name from a cross between Vialone and Lady Wright, and has larger grains than any other Italian variety, with a 100 corn weight of 47 grm. Its grain yield is higher than that of Vialone and almost equals Americano. The grain is of exceptionally high quality, though this variety is still not completely homogeneous in degree of pearliness, which leaves scope for further selection.
The variety Rinaldo Bersani was produced by the brothers Bersani from a natural cross in a field of the variety Sesia. It ripens a few days earlier than Arborio and though it has slightly smaller grain, it is still in the very high quality class. Both varieties compare very favourably with rices of the Carolina type.

352. Oryosi [Oryoji], G.
(Sterility of F_1 plants obtained from the crossing between Formosan and Japanese varieties of rice).
Rep. Formosan Agric. 1941 : **37** : 32–37 [from Jap. J. Bot. 1943 : **12** : Abst. 205].

Good results were obtained in crosses between the Indian and Japanese types of rice but the F_1 were about 65·3% to 82·57% sterile. The pollen grains were small and varied in size. Back crosses showed that there was sterility also on the female side.

353. Nagao, S. and
Takahashi, M.
(Studies on the hybridization of rice. I. Heterosis in the crosses between the strains of Hokkaido, considered from the standpoint of strain phylogeny).
Rep. Sapporo Soc. Agric. For. 1941 : **34** : 1–22 [from Jap. J. Bot. 1943 : **12** : Abst. 178].

Heterosis was studied in a number of crosses between various strains, both starchy and glutinous, length and weight of hulled grains, panicle weight, number of tillers and total weight being taken into account. The weight of the hulled grain may increase by over 15% and panicle weight 20 to 30%. The degree of heterosis varies according to the direction of the cross because of the influence of the endosperm.

354. Tkatchenko [Tkačenko], B.
La riziculture en U.R.S.S. **(Rice cultivation in the USSR).**
Rev. Bot. Appl. 1950 : **30** : 278–97.

Based on a bibliography of 30 references, this paper records the principal centres of rice cultivation in the USSR, the varieties grown and their biological requirements. Guščin's classification of rices is cited; and methods of cultivation are discussed.

355.
Nasce l'Associazione dei selezionatori di sementi di riso. **(The Association of rice seed selectionists is born).**
Risicoltura, Vercelli 1950 : **38** : p. 154.

An association of rice seed selectionists for the Vercelli province of Italy was instituted in May 1950.

356. Wilshaw, R. G. H.
Agronomic and breeding research on rice, oil-palms, and cacao in Malaya. Part I. Rice.
Emp. J. Exp. Agric. 1950 : **18** : 227–32.

A review is presented of investigations on rice, including breeding work, carried out by the Department of Agriculture in Malaya. Selection is now in progress in Kedah, Krian and Malacca and for varieties suitable for Negri Sembilan and Penang; and varietal surveys are being made.

357. Ting, Y.
(The origin of rice cultivation in China).
Agron. Bull. Sun Yatsen Univ. 1949 : Ser. III : No. 7 : Pp. 18.

Specimens of rice have been discovered in China dating from the third millenium B.C., and Chinese characters for rice appear in inscriptions dating form the second millenium B.C. The Chinese term for rice, tao, is believed to correspond etymologically to similar terms for rice found in Indochina and Thailand. The Malayan and Indian terms appear unrelated. In view of the number of wild rices found in southern China, rice cultivation is believed to have started there and spread northward. In the first century B.C. most of the rice cultivated in China was of the semiglutinous type.

358. Ghosh, B. N.
Physiological studies on the effect of colchicine on rice. II.
Proc. Nat. Inst. Sci. India 1950 : **16** : 135–45.

Observations are recorded on the vegetative growth, flowering and yield of Dhairal rice progenies subjected to different colchicine treatments and of untreated progenies. Large grains were obtained from tetraploid tillers; it remains to be seen whether the plants they produce will be of economic value. No increase in stomatal size was observed, but pollen size was increased by colchicine treatment. Retardation of flowering and increased yields were noticed in treated plants.

359. Kihara, H. and
Hirayoshi, I.
(The development of the pollen grain in *Oryza sativa* L.).
Bot. and Zool. 1942 : **17** [?] : 686–90 [from Jap. J. Bot. 1943 : **12** : Abst. 150].

The development of the pollen tetrads to pollen grains has been studied in detail. In general the process is similar to that found in *Triticum* and other grasses. The unusual course of development observed in the maturation of the pollen grain is described.

360. Minomoto, F.
(Experiments on germination under special conditions with rice varieties).
Proc. Crop Sci. Soc. Japan 1944 : **15** : 211–16.

Varietal differences are reported in the ability of rice to germinate from immature grains and to germinate after heat treatment at 65°C. for 20–25 minutes. It was found that the varieties best able to germinate after heat treatment tended to come from hotter regions.

361. Saito, K.
(Studies on the rice plant in the delta region of the Yangtsekiang. I. The effect on earing date of sowing Japanese, Chinese and Indian rice varieties at different times).
Proc. Crop Sci. Soc. Japan 1944 : **15** : 137–53.

Extensive data are given on the earing date, number of leaves on the main stem and number of ears per plant of 78 Japanese, Chinese and Indian varieties sown at five different times.

362. Saito, K.
(Studies on the rice plant in the delta region of the Yangtsekiang. II. On the classification of glutinous rice and the rate of germination).
Proc. Crop Sci. Soc. Japan 1944 : **15** : 154–64.

The classification of glutinous rice and its relations with other types of rice are considered, and data are presented on the rate of germination of 98 varieties of glutinous and semi-glutinous rice.

363. Miyayashi, T.
[Differences between rice varieties in respect of changes in growth period brought about by unusual photoperiods (Preliminary Report)].
Proc. Crop Sci. Soc. Japan 1944 : **15** : 194–96.

Alterations in the growth period of five Japanese varieties when grown under photoperiods of 7, 9, 11, 12, 13, 14, 15 and 17 hours are described.

364. Larter, L. N. H.
Natural cross pollination of wet padi in Malaya.
Malay. Agric. J. 1950 : **33** : 82–88.

In an experiment at the Titi Serong Padi Experiment Station, Perak, the occurrence of hybrids resulting from natural cross pollination was concluded to be approximately 1%, after making allowance for the probability that non-simultaneity of flowering reduced the likelihood of cross pollination, and that cross pollination might not produce any visible effect on account of the heterozygosity of the male parent plants for the marker characters used to detect natural cross pollination. Further study of the amount of natural cross pollination in rice is to be undertaken in other localities.

365. Nagao, S. and
Takahashi, M.
(Studies on hybridization of rice. III. Type and inheritance of awnedness in rice).
Rep. Sapporo Soc. Agric. For. 1942 : **34** : 36–43 [from Jap. J. Bot. 1943 : 12 : Abst. 179].

Kinds of rice were classified into five categories ranging from fully awned to awnless. The inheritance of these five conditions is attributed to the combined action of three genes, An_1, An_2 and An_3, and their alleles.

366. Fernando, L. H.
The performance of the salt-resistant paddy, Pokkali in Ceylon.
Trop. Agriculturist 1949 : **105** : 124–26.

The rice variety Pokkali, which has been tested at the Ambalantota Paddy Station and which is now cultivated to a considerable extent on saline land in Ceylon, is described. Its most valuable characters are a high degree of resistance to salinity, lodging and shedding.

367. Yoshii, H.
(Studies on the nature of rice blast resistance. IV. Relation between varietal resistance to rice blast and some physical and chemical properties of the leaf-blade).
Ann. Phytopath. Soc. Japan 1941 : **11** : 81–88 [from Jap. J. Bot. 1942 : 12 : Abst. 116].

Experiments showed that resistance to blast, caused by *Piricularia Oryzae*, was not affected by adding three times the nitrogen component to the culture solution.

368. Fernando, L. H.
Studies in Ceylon paddies. I. Investigations on varieties grown in the Hambantota district.
Trop. Agriculturist 1949 : **105** : 162–70.

Observations were made on rice varieties grown in the two seasons November-December and May-June at Ambalantota and Tissamaharama in the Hambantota district during the period 1945 to 1948.

369. REED, H. S.
A new species of *Chenopodium* from Mexico.
Madroño, Lancaster, Pa 1950 : **10** : 139–42.

A description is given of the hitherto undescribed Mexican pot herb cuahzontli. It is named *Chenopodium pueblense*. It has $2n = 36$ chromosomes.

370. CHEVALIER, A.
Sur l'origine des *Digitaria's* cultivés. (**On the origin of the cultivated *Digitaria*).**
Rev. Bot. Appl. 1950 : **30** : 329–30.

The probable place of origin of the two species *D. exilis* and *D. iburua* is regarded as the southern borders of the Sahara. The species *D. sanguinalis*, formerly cultivated in Asia and Europe and now found in most temperate countries, originated in China.

FORAGE GRASSES

371.
Ensayos de variedades. (**Variety tests**).
Bol. Inst. Nac. Invest. Agron. Madr. 1950 : **10** : p. 266.

A collection of over 350 varieties of forage plants is being maintained by the Spanish national institute of agronomic research at its experiment station at Aranjuez. Observations so far made on the collection indicate that some of the forms are definitely promising for cultivation in Spain, particularly certain varieties exceptionally resistant to drought.

372. GILDENHUYS, P. J.
Grass breeding for rotational farming.
Fmg S. Afr. 1950 : **25** : 151–53.

The value of mat and tuft grasses is discussed. In South Africa grass breeding has only just begun. It is emphasized that much more information is required on breeding behaviour, to achieve the aim of developing strains with high seed setting ability. Possibly the partial sterility of the tuft grasses is due to hybrid origin. In *Setaria sphacelata* the breeding of strains which retain their seed at maturity or ripen their seed more uniformly is desirable. In view of the wide range of conditions in the country, improvement by strain building is considered to be more suitable than single line selection.

373.
U.S. receives gift of New Zealand grass.
Seed World 1950 : **67** : No. 5 : p. 44.

Grass and clover seed including high protein yielding strains of rye grasses from New Zealand have been distributed to state experimental stations in various parts of USA for testing.

374. STEBBINS, G. L. (JUN.).
New grasses. Drought-resistant strains of perennials developed for dry range lands.
Calif. Agric. 1950 : **4** : No. 9 : 5–6, 10.

Hybridization work being carried out in California to develop drought resistant perennial forage grasses is described. On a small scale promising results have been obtained with hybrid derivatives from a cross between two strains of brome grass originating from

different regions in California, hybrids between blue wild rye (*Elymus glaucus*) and squirrel tail grass (*Sitanion Hystrix*), and with cocksfoot hybrids between a type introduced from Palestine and a commerical strain.

375. Hafenrichter, A. L.,
Mullen, L. A. and
Brown, R. L.
Grasses and legumes for the Pacific Northwest.
Seed World 1950 : **67** : No. 4 : 16, 18, 34.

Tests of various accessions of *Lolium multiflorum, L. perenne, Hordeum bulbosum, Elymus canadensis, E. glaucus, Phleum pratense* and *Ph. Boehmeri* are mentioned.

376. Nissen, Ø.
Chromosome numbers, morphology, and fertility in *Poa pratensis* L. from southeastern Norway.
Agron. J. 1950 : **42** : 136–44.

A study was made of chromosome numbers, morphology and fertility in 24 strains of *P. pratensis*, collected from pastures in southeastern Norway and selected as valuable pasture types. Nearly all the strains had aneuploid numbers, varying from $2n = 53$ to 92. Approximately one-tenth of the single seedlings and one-third of the twin seedlings had aberrant numbers. The data on chromosome numbers have led to the conclusion that apomixis is the usual mode of reproduction in the Norwegian material investigated.
The variation of a number of characters between and within strains was studied for one or two years. The following characters showed highly significant differences between strains: numbers of culms per plant, culm height, culm thickness, percentage of bad pollen, pollen grain diameter, variability in pollen size, shape of pollen grains, number of flowers per spikelet, seed set, seed weight, percentage germination, percentage of multiple seedlings, and three different measurements of panicle size. Highly significant positive correlation was found between chromosome numbers and the following characters: stoma length, pollen diameter, seed weight, and numbers of branches at the lowest node in the panicle. No significant correlation was found between percentage of multiple seedlings and chromosome number, seed weight or germination.

377. Beetle, A. A.
A sectional treatment for the North American species of *Agrostis*.
Univ. Wyo. Publ. Sci. 1950 : **15** : No. 2 : 29–36.

The taxonomy of *Agrostis* is discussed and a scheme is put forward whereby the genus is divided into six sections. Illustrations are provided of the lemmas of 31 species.
The contrasting characters of *Agrostis* and *Polypogon* are summarized. It is pointed out that *A. semiverticillata* differs from both these genera and should probably not be included in either.

378. Böcher, T. W.
Chromosome behaviour and syncyte formation in *Phleum phleoides* (L.) Karst.
Bot. Notiser 1950 : **3** : 353–68.

Meiosis is described in plants of *Ph. phleoides* from Denmark, Sweden, France, Poland, Germany, Bulgaria and Armenia. The chromosome number is $2n = 14$ or $2n = 28$. B chromosomes are often present. Structural aberrations were noted in some cases. Syncyte formation was fairly frequent in two samples.

379. KNOWLES, R. P.
Studies of combining ability in bromegrass and crested wheatgrass.
Sci. Agric. 1950 : **30** : 275–302.

Studies of combining ability were carried out with single open-pollinated plants of commercial strains of brome grass, Fairway crested wheat grass and Standard crested wheatgrass, and with inbred plants of Fairway crested wheat grass. Combining ability was analysed in progenies of various types, including controlled single crosses, open-pollinated progenies, and in certain cases polycross and top cross progenies; yield of forage was used as the main criterion of combining ability but since brome grass is a rhizomatous species observations were also made on degree of creeping in this grass. All plants were studied under space planted conditions.
The open-pollinated selections of brome grass and three groups of crested wheat grass showed significant difference in combining ability. In Fairway crested wheat grass the value of the inbred plants as parents was below that of the non-inbred material. Open-pollinated progenies of selected plants gave indices of combining ability in agreement with those obtained from the controlled single crosses in crested wheat grass, but not in brome grass; the lower correlations between the forage yields of these two types of progenies of brome grass were considered to result largely from the contamination of the progenies of the controlled single crosses with selfed plants. The yields of polycrosses of brome grass showed very low correlations with the yields of single crosses.
Single plants varied in their reliability as top cross testers of combining ability. Approximately half of the plants in each of the three groups of crested wheat grass gave yields in top cross progenies which were significantly correlated with the yields of controlled single crosses involving these particular selections. None of the selections of brome grass was satisfactory as a top cross tester.
In brome grass, comparisons of the degree of creeping of parent clones and progenies gave correlation cofficients of + 0·97, + 0·87 and + 0·74 for single crosses, open-pollinated progenies and polycrosses, respectively. Thus the spreading character appears to be highly heritable, indicating that selection for this character in parental clones is possible.
The Standard type of wheat grass was damaged by the western wheat aphis (*Brachycolus tritici*). A highly significant correlation of + 0·89 was obtained between the aphis resistance of open-pollinated progenies and that of the single crosses.
In the case of forage yield, little relationship was found between the yields of parent clones and those of the progenies belonging to the four groups of both brome grass and crested wheat grass plants, indicating the importance of using progeny rather than clonal lines in the evaluation of selections.
The results lend support to the current practice of selecting plants from open-pollinated or crossed populations, and evaluating selections on the basis of the performance of open-pollinated progenies. It is emphasized that specific combining ability should be considered in forming new composite strains.

380. WAGNON, H. K.
Nomenclatural changes in *Bromus*.
Rhodora, Lancaster Pa 1950 : **52** : 209–15.

B. Pumpellianus is reduced to a variety of *B. inermis*.

381. SINISALO, J.
Fröodling av ängssvingel. (**Seed production of meadow fescue**).
Forsknings- o. FörsResult. 1950 : **2** : p. 32.

In competition with Danish imported varieties of meadow fescue, the Finnish varieties Paavo, bred at Jokioinen, and the Tammisto strain are at some disadvantage, as, owing to the relatively small number of stems they produce, the yield of seed is reduced. But in

view of their winter hardiness and abundant foliage, efforts should be made to increase their seed production.

382. KREITLOW, K. W.,
SHERWIN, H. and
LEFEBVRE, C. L.
Susceptibility of tall and meadow fescues to *Helminthosporium* infection.
Plant Dis. Reporter 1950 : **34** : 189–90.

None of the strains of tall fescue (*Festuca elatior* var. *arundinacea*) tested were resistant to *H. dictyoides*, a result emphasizing the erroneousness of the popular views that tall fescue is in general more disease resistant than meadow fescue (*F. elatior*). Differences in reaction to *H. dictyoides* among plants of the two fescues in both field and greenhouse experiments suggest the possibility of isolating plants resistant to the disease.

383. HAFENRICHTER, A. L.
Grasses and legumes for the Pacific Northwest.
Seed World 1950 : **67** : No. 3 : 40–41.

Among 30 accessions of tall oat grass, two types were found: the common strain and an improved strain, Tualutin. The latter is leafier and later than the common strain, has small corms and does not shatter.

384. GEORGE, L. V.
Ergot-hampered Dallis grass revived by healthier new strains.
Sth. Seedsman 1950 : **13** : No. 10 : 17, 57.

Seed of two strains of Dallis grass B–230 and 430, developed at the Louisiana Agricultural Experiment Station from selections of native material, has been released for commercial increase. In comparison with the native strains they show improvements in seed production, forage yield and ergot resistance.

385. ROBINSON, B. P. and
POTTS, R. C.
The history of *Hyparrhenia hirta* and studies of its flowering habits and seed production.
Agron. J. 1950 : **42** : 395–97.

H. hirta was introduced into the United States in 1905. Although most authorities in North America have not considered this grass valuable as a forage plant, it appears to be well adapted in certain areas of Texas. Experiments have therefore been undertaken at the College Station, Texas, to study (1) the time of day of anthesis and the order of anthesis in the inflorescense, (2) variation in seed setting among plants, and (3) the relation between seed setting and germination.
From data on 88 plants it was found that a high degree of variation existed between plants in their ability to set seed. A highly significant positive correlation was obtained between amount of seed setting and germination. This information should prove useful in selection.

386. GILDENHUYS, P. J.
A new fodder grass. A promising cross between babala and napier fodder.
Fmg S. Afr. 1950 : **25** : 189–91.

Sterile perennial F_1 hybrids between babala (*Pennisetum typhoides*) and napier grass (*P. purpureum*), produced at the Potchefstroom College of Agriculture, have yielded 91 tons of

green fodder per morgen in preliminary trials. In view of their sterility they have to be propagated by slips or rooted cuttings. Attempts are now being made to induce fertility in the hybrids by colchicine; back-crossing is also being attempted. If fertile hybrids are obtained, it is hoped that it will be possible to select a large seeded perennial type combining the desirable characters of both parents.

387. Brown, W. V.
A cytological study of cleistogamous *Stipa leucotricha*.
Madroño, Lancaster, Pa 1949 : **10** : 97–107.

An embryological study of the cleistogamous flowers of *S. leucotricha* is reported. There appeared to be $2n = 26$ chromosomes; in one pollen mother cell, two univalents were observed and in another a quadrivalent.

388. Stebbins, G. L. (Jun.) and
Singh, R.
Artificial and natural hybrids in the *Gramineae*, tribe *Hordeae*.
IV. Two triploid hybrids of *Agropyron* and *Elymus*.
Amer. J. Bot. 1950 : **37** : 388–93.

Further evidence is presented on the relationships of *A. Parishii* (previously designated *A.* sp. San Benito) and *E. glaucus* (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. **1776**), based upon cytological analysis of the hybrids *A. inerme* ($2n = 14$) x *E. glaucus* ($2n = 28$) and *A. Parishii* ($2n = 28$) x *A. spicatum* ($2n = 14$).
The former hybrid was intermediate between its parents in external morphology, except that it usually had the characteristic of one spikelet at each node of the rachis shown by *Agropyron*; the second hybrid was hardly distinguishable morphologically from *A. Parishii*.
At first metaphase of meiosis the most common configuration observed in *A. inerme* x *E. glaucus* consisted of seven bivalents and seven univalents. A bivalent usually had a single chiasma. At anaphase I and II, sporocytes containing bridges and fragments were found. A low chiasma frequency and direct observation of fragments without bridges suggested that many of these bridges were due to reunion of sister chromatids after spontaneous chromosome breakage rather than to crossing over in heterozygous inverted segments.
In the hybrid *A. Parishii* x *A. spicatum*, 85% of the sporocytes had either seven bivalents and seven univalents, or one trivalent, six bivalents and six univalents. The bivalents usually had two chiasmata. Bridges and fragments were relatively uncommon at anaphase I and were not found in anaphase II; no evidence of spontaneous chromosome breakage was obtained.
The following genomes are proposed: *A. inerme* and *A. spicatum*, $A_1A_1E_1E_1$; and *E. glaucus*, $A_2A_2E_1E_1$. The genome A_1 carries genes for slender growth, narrow glaucous leaves, elongate spikes with the spikelets single at the nodes, glumes shorter than lemmas, and large anthers. Genome E_1 is believed to be associated with tall growth, narrow glaucous leaves, elongate spikes, spikelets double at the nodes, relatively long glumes, and probably large or medium sized anthers; no diploid species of this type is known and the original bearer of genome E_1 may be extinct. Genome A_2 is believed to carry genes for relatively short, stocky growth, broad and possibly green rather than glaucous leaves, short dense spikes, narrow glumes and long awns.

LEGUMINOUS FORAGE PLANTS

389. Hanson, C. H.
New forage varieties for North Carolina.
Res. and Fmg, N.C. 1950 : **9** : 24–25.

Forage crop breeding in North Carolina is briefly reviewed. Work is in progress to develop lucerne varieties with greater longevity and also lucernes with improved seed production, and big trefoil strains resistant to foliage blight caused by *Rhizoctonia Solani*. Promising

strains of lespedeza have been produced in cooperation with the Division of Forage Crops and Diseases, Beltsville, Md. One of these, a Korean strain designated FC31480–43, possesses a higher degree of resistance to powdery mildew and root knot nematode than commercial varieties.

390. Bolton, J. L. and
Greenshields, J. E. R.
A diploid form of *Medicago sativa* L.
Science 1950 : **112** : 275–77.

A form of *M. sativa* with the diploid chromosome number of $2n = 16$ has been discovered at the Forage Crops Laboratory, Saskatoon. It occurred among plants raised from a seed sample originating from the Botanical Gardens, Academy of Sciences, Armenian SSR, at Erevan, USSR, which was collected from a wild plant. In some characters, e.g. size of plant parts and decumbent habit, it resembles 16–chromosome forms of *M. falcata* rather than normal *M. sativa*. The diploid form of *M. sativa* is highly self sterile, and highly cross sterile when hybridized with 32–chromosome forms of *M. sativa* and *M. falcata*; when crossed with 16–chromosome plants of *M. falcata* it exhibits normal cross fertility.

391. Gricenko, T. G.
(Open intervarietal hybridization of lucernes).
Agrobiologija (Agrobiology) 1950 : No. 3 : **138–42**.

Breeding work with lucerne at the USSR Scientific Research Institute of Cotton Breeding in Taškent is reported. Intervarietal cross pollination was found to be an efficacious method for increasing hay and seed yields, provided the differences in the inheritance of the components were sufficiently great and yet not too wide. Good results were obtained with the following single crosses in Soviet Central Asia: Uzgenskaja x Peruvian and Ferganskaja [Fergana] x Peruvian, which were productive under the conditions of the central cotton zone; Peruvian x Geoktipinskaja; Peruvian x Arabian and Arabian x Mesopotamian or Sudan lucerne, which were adapted to the southern cotton zone; and Horezmskaja [Horezma] x Semirečenskaja [Semirečensk] and Horezmskaja x Ferganskaja, which did best in the Horezma and Tašanzskaja provinces and the Kara Kalpak Autonomous Republic. It is considered that intervarietal hybridization without subsequent training upon good soils is valueless.
A detailed account is given of the improvement of the medium early variety 700, which is related to Ferganskaja and is a standard in the Taškent and South Kazahstan provinces. The variety was grown (*a*) by itself, (*b*) with 197 varieties less productive than itself, (*c*) with 480 medium early or early adapted varieties as productive or more productive than itself, (*d*) with 266 promising new medium early and early varieties yielding as much as or more than 700, and (*e*) with 14 varieties of the last named group.
The hay yield records of the hybrid lucernes for three years were better than the yield of 700 in pure sowing, a single exception being a slightly lower yield in the first year of group (*b*), which became more productive in the second and third years. The greater vitality of the hybrid lucernes is indicated by their better developed roots, whose dry weight in the 25 cm. deep layer of the soil was between 8·7% and 36·1% higher than that of the variety 700.
Mention is made of new productive varieties, 922 and 925, obtained by intervarietal cross pollination of some adapted local varieties used as female parents and of a giant lucerne with branching umbellate clusters which was selected individually in a nursery for intervarietal hybrids in 1943. Although in this instance individual selection was warranted, its application to selection work with lucerne is not recommended.

392. Tisdale, S. L.,
Davis, R. L.,
Kingsley, A. F. and
Mertz, E. T.
Methionine and cystine content of two strains of alfalfa as influenced by different concentrations of the sulfate ion.
Agron. J. 1950 : **42** : 221–25.

Two clonal lines of lucerne, C–3 and C–10, were believed to possess different methionine and cystine contents under identical growth conditions. When grown in nutrient solutions with varying concentrations of the sulphate ion, the clonal lines and their S_1 progeny exhibited considerable difference in ability to synthesize both methionine and cystine at a given concentration of sulphur, C-10 having the higher efficiency. On the average, the difference tended to be more marked at the lower levels of sulphur. With respect to total sulphur and total nitrogen no consistent relationship between the clones and their selfed progeny was obtained as in the case of cystine and methionine contents. The results show that analysis of total nitrogen and total sulphur may lead to erroneous conclusions concerning quality; total nitrogen was highest at the low level of sulphur; conversely the methionine and cystine contents were lowest at the low levels of sulphur.

393. Vasiljčenko, I. T.
(China's wild perennial lucernes).
Priroda (Nature) 1949 : No. 1 : 82–83.

Brief descriptions are given of three species of lucerne designated by the present writer *Medicago Roborovskii*, *M. alashanica* and *M. beipiensis* respectively.
M. Roborovskii was found by V. I. Roborovskii in the eastern T'ien Shan. It has large mauve flowers and ring shaped pods. The species resembles *M. tianschanica* differing from it only in the structure of the flower: the flowers of the former have a broad standard and the wings are of different size and shape. The species can be grouped with the T'ien Shan lucernes.
M. alashanica is a pale yellow lucerne which was collected by S. S. Četyrkin in the Ala Shan. It has small flowers and small pods, which are only slightly incurved; it can be grouped with the Ala Tau lucernes found in the mountainous steppes of Soviet Central Asia.
M. beipiensis was found in the mountains near Peiping. It has small flowers and small pods twisted in a similar manner to those of *M. coerulea*. It differs from the latter species, many forms of which are found in the USSR, by a somewhat larger and venose pod. Lucernes closely resembling *M. beipiensis* have been found by M. V. Pevcov in the eastern T'ien Shan.

394. Maksimov, N. A.
(The Institute of Plant Physiology sets out along a new path).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci USSR) 1949 : No. 11 : 51–58.

Recent activities of the Timirjazev Institute of Plant Physiology include the study of agrobiological problems associated with the yielding capacity of cereals, forage plants and sunflower and their resistance to drought.
It is reported that the resistance to drought of sainfoin, the lucerne variety Grimm Zaĭkevič and sunflower was improved by drying of vernalized seed. This technique is based on Lysenko's teaching that heritable properties in plants can be changed as a result of environmental training during the vernalization phase.
Mention is made of Mičurinite methods in the selection of cotton for tolerance to soil salinity and of citrus fruits for hardiness.

395. Wagn, O.
Undersøgelser og forsøg over kløveralens udbredelse, skadevirkning, smitteforhold og bekæmpelse. (**Investigations and experiments on range, damage, conditions for infestation and control with reference to clover stem eelworm**).
Tidsskr. Landøkon. 1950 : No. 3 : 157–60.

In 1949 the Clover Stem Eelworm Committee in Denmark, concerned with the above investigation, conducted resistance tests on ten strains of red and white clover.
The most resistant Danish red clovers were Lofa and Hjelm, but they were surpassed by the Swedish strains, Merkur and Resistenta.
The white clovers showed great variation in resistance to the white clover stem eelworm, the best strains being of the wild English type. Strynø and Morsø strains showed considerable susceptibility.
The susceptibility of the various clover species and lucerne to attack by the red clover and white clover stem eelworms and the lucerne stem eelworm was also studied.

396. Bingefors, S.
Undersökningar över klövernematodens utbredning och förutsättingarna för resistensförädling av rödklöver i mellersta och norra Sverige. II. (**Investigations on the distribution of the clover eelworm and the essential conditions for breeding red clover for resistance in central and northern Sweden. II**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 245–76.

Part I of the above paper comprises an extensive review of relevant literature, and also information on the distribution of *Ditylenchus dipsaci* in Sweden, its modes of dissemination and factors affecting intensity of the attack.
Part II is concerned with the occurrence of resistant red clover strains in various countries, particularly Sweden, where extensive trials of local strains have been carried out and where possible strain differences in nematode resistance have been specially investigated at the Ultuna Station of the Swedish Seed Association. There it was found that the bred strains obtained by natural selection on infested soil retained this resistance in central Sweden, but they were not winter hardy enough for general cultivation in that region. No local strains have equalled them in resistance and, furthermore, any differences in the resistance of local strains have generally varied from trial to trial.
The writer also considers some difficulties of field selection for resistance and some advantages that might be derived from the use of artificial infection with special reference to the seedling stage reaction.

397. Hogg, P. G.
Kenland best in red clover comparisons.
Miss. Fm Res. 1949 : **12** : No. 5 : 1, 2.

Yield data are presented for nine varieties of red clover tested in 1947 and 1948. Kenland was outstanding, particularly for its ability to survive winter damage. Wisconsin Mildew Resistant showed significantly greater resistance to mildew than the other varieties.

398. Frandsen, H. N.
Hvidkløverstammernes resistens mod kløveraal. (**The resistance of white clover strains to clover stem eelworm**).
Tidsskr. Frøavl. 1950 : **20** : 4–5.

In comparative experiments the variety Vild engelsk [Wild English] Øtofte IV proved more resistant to the special white clover stem eelworm than Morsø Øtofte IK and Øtofte IK. Lodi Øtofte IK and V, however, was at least equally resistant.

399. FENAROLI, L.
I "Velvet beans." Notizie botaniche e agrarie sulle specie ascritte al genere *Stizolobium* e affini. (**Velvet beans: botanical and agronomical notes on true and related species of *Stizolobium***).
Suppl. Ann. Sper. Agrar., Roma 1950 : **4** : XXXV–LXII.

Reference to the literature reveals considerable uncertainty concerning the true taxonomic relationships of the genus *Stizolobium*. Four species, *S. aterrimum*, *S. Deeringianum*, *S. Hassjoo* and *S. niveum*, have given rise to cultivated varieties in the USA and these are described on the basis of the published literature. Information is given on their cultivation and utilization. Their cultivation is thought to offer definite promise in the irrigated zones of central and southern Italy.

400. WEBSTER, G. T.
Fertility relationships and meiosis of interspecific hybrids in *Melilotus*.
Agron. J. 1950 : **42** : 315–22.

The following crosses were obtained: *M. suaveolens* (annual) x *M. alba*, *M. alba* x *M. suaveolens* (annual and biennial), *M. alba* x *M. polonica*, *M. polonica* x *M. suaveolens* (annual and biennial), *M. suaveolens* (annual) x *M. wolgica*, *M. italica* x *M. messanensis* and *M. alba* x *M. taurica*. Because of the larger number of plants secured and their greater vigour, hybrids involving *M. alba*, *M. polonica* and *M. suaveolens* were chosen for detailed analyses of pollen condition and self fertility. The F_1 of crosses involving these species showed an average of approximately 75% self aborted pollen and 20% self fertility. Under greenhouse conditions parent plants exhibited from 95 to 100% normal pollen and an average of nearly 45% self fertility. The mean percentages of normal pollen and self fertility increased in the F_2 and F_3 generations; several plants showing normal pollen and high self fertility were recovered. The percentage of stainable pollen and self fertility in the F_2 plants were positively correlated; ovule abortion was apparent but was of a lower frequency than pollen abortion. Meiosis in the F_1 and F_2 hybrids appeared to be as regular as that in the three parent species. It was concluded that pollen abortion is affected by other factors besides meiotic irregularities.

401. HAGBERG, A.
Egenskaper och arvsanlag hos söt och bitter lupin. (**Characters and hereditary factors in sweet and bitter lupin**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 220–24.

In sweet lupin selection two difficulties arise: (1) no absolute correlation exists between the alkaloid content in the leaf or other green parts and the content in the seed; and (2) the genotypic constitution as regards alkaloid content is not directly evident in the properties of the plant.
Chemical analysis of the F_1 and F_2 from a cross of the Svalöf sweet lupin variety Borre and a bitter Swedish land variety (both of the species *Lupinus angustifolius*) from Vereböd in Skåne showed that, with the analytical technique used, the alkaloid content of the plants could not be determined until five or six weeks after the sowing date, and at no time with absolute certainty. Only the ripe seed can reveal the genotypic conditions as regards alkaloid content.
In genotypically sweet F_2 plants, derived from bitter F_1 seeds on the mother plant, the alkaloid content did not sink below the detectable level for about two months or more after sowing.
Possible methods of maintaining stocks of sweet lupins are mentioned.

402. Potresova, M. A.
(New forms of yellow lupin).
Agrobiologija (Agrobiology) 1950 : No. 3 : p. 152.

Two new forms of lupin were selected from the variety AB–500 at an experimental field of the Institute of Socialist Agriculture of the Academy of Sciences of the White Russian SSR. The initial variety AB–500 was obtained by group selection from a white seeded indehiscent yellow fodder lupin originating from the state varietal collection. The original plant material was uniform and has been maintained in a pure state. The new forms arising from AB–500 in the fourth year of its reproduction are therefore regarded as a result of changes in inheritance due to external influence.
One of the new forms differs from AB–500 by the pale green colour of its vegetative organs, larger number of leaflets and laminae which are more spreading and fold up at a later hour in the evening. Moreover, the leaves of the new form remain in a state of turgor for a longer period under wilting conditions. The new form is early and more adaptable to local conditions. One plant of this form, designated 9–25, was noted for its early and uniformly productive upper lateral shoots. It resembled plants obtained from vernalized seed. The seed of all plants derived from AB–500 was white and sweet as in the initial variety but the seed of 9–25 had a slightly different angular form.
The other form of early lupin, 9–30, had lemon yellow petals and the stems were brighter green than the stems of AB–500. Otherwise it did not differ from the initial variety, which was remarkable for its indehiscent pod, earliness, productiveness and non-alkaloid seed.

403.
Growing field peas for stock feeding.
Adv. Leafl. N.A.A.S. 1950 : No. 300 : Pp. 5.

Descriptive notes are included on the Maple, Dun and other types of field pea suitable for cultivation in England.

404. Weimer, J. L. and
Warnock, C. H. (Jun.).
New winter-wonder pea.
Sth. Seedsman 1950 : **13** : No. 8 : p. 14.

Two new hybrid varieties, at present designated H277–19A and H241–10E, have shown improvements over the Austrian Winter pea in tests conducted in Georgia. Both varieties appear to be more resistant to root rot than Austrian Winter; they also survive the attacks of leaf and stem diseases long enough to make a satisfactory cover crop.

ROOTS AND TUBERS

405. Jähnl, G.
Über die Ertragsfeststellung bei Versuchen mit Beta-Rüben. **(On the determination of yield in beet trials).**
Bodenkultur, Wien 1950 : **4** : 238–41.

The effect of failures amongst the plants in the growing of root crops causes difficulties in the mathematical determination of the yield per hectare. Several methods of estimating the yield are discussed.
In trials at the Admont Federal Research Institute with 3 varieties of sugar beet and 7 varieties of fodder beet, the actual yields were found and compared with the yields as estimated by Roemer's "normal plant method." The yield per hectare as calculated by

Roemer's method was always greater than the actual yield per hectare; moreover, the excess in yield given by Roemer's formula over the actual differed for sugar beet and fodder beet, being about 10% and 22% respectively; in the case of foliage, however, the excess in yield as calculated by Roemer's method over the actual yiield was about 32% for each kind of crop.
In sugar beet trials the excess in the calculated yield of roots over the actual yield was unaffected by locality, whereas the fodder beet values showed considerable variations in the excess values in different localities, which seems to indicate a correlation between the absolute yield values and the calculated value.
The provisional conclusion is that the approximate validity of Roemer's "normal plant method" of calculating yield per hectare requires a certain degree of vigour of growth and a yield above a certain minimum.

406. Nissen, Ø.
Forsøk med stammer av fôrbeter 1944–1947. (**Trials with strains of fodder beets 1944-47**).
Forskning Forsøk. Landbruk., Oslo 1950 : **1** : 74–90.

Forsøk med stammer av fôrbeter 1944–49. (**Trials with strains of fodder beets 1944-49**).
Forskning Forsøk. Landbruk., Oslo 1950 : **1** : p. 237.

The 34 Danish, Norwegian, Swedish and German varieties tested at various places in Norway comprised sugar beets intended for forage, sugar mangels and ordinary mangels.
On the whole the sugar mangels gave higher yields of dry matter in the roots than the mangels, and the Danish strains proved superior in nearly all the trials. The five best strains were Gul Dæno [Yellow Dæno] X, Hvid Strynø [White Strynø] X, Pajbjerg Korsroe [Pajbjerb Hybrid], Regia and Hvid Dæhnfeldt [White Dæhnfeldt].
The varieties were also compared with reference to their economic value, which depends not only on yields but on costs of harvesting and transport in Norway.
The second paper supplements the first with a table showing the average yield of dry matter per dekar of the ten best strains in the above trials up to 1949.

407. Giering, E.
Zur Unterscheidung der Sommer- und Winterformen von Raps im Laboratoriumsversuch. (**On distinguishing between spring and winter forms of rape in laboratory experiments**).
Z. Acker- u. Pflanzenbau 1950 : **92** : 287–96.

In the case of spring rape the primary leaves, which were just emerging from the shoot bud, could be distinguished, under quite low magnification, by their pubescence; at the same stage in the case of seedlings of the German winter rape varieties studied, pubescence was either absent or extremely sparse. This test is taken to be a criterion giving a high degree of certainty in distinguishing between spring and winter rape.

408.
Las papas suramericanas y su valor genético. (**The South American potatoes and their breeding value**).
Rev. Fac. Nac. Agron. Colombia 1950 : **11** : No. 37 : 34–54.

A Spanish translation is given of the technical communication with the above title published by the Commonwealth Bureau of Plant Breeding.

409. TEDIN, O.
Svalöfs Evapotatis (42096). Ny, kräftimmun, mycket tidig sort. [**The Svalöf potato Eva (42096). A new wart resistant, very early variety**].
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 215–19.

This new variety (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1328) is derived from the cross King George V x Böhm's Mittelfrühe [Böhm's Medium Early] and is biologically later maturing than the standard variety Early Puritan. In 17 trials it has surpassed the latter by 15–20% of saleable tubers, when grown in southern Sweden where the crop can be lifted at the earliest possible time for harvesting Early Puritan. It is fairly resistant to late blight and to the main virus diseases and it also shows resistance to brown rot. Used as a "fresh" potato in the Swedish sense, i.e. before maturity, Eva is similar in quality to Early Puritan which it, however, surpasses by 50% in vitamin C content.
The flowers, which are fairly numerous, are moderately large and light violet in colour.

410. WENZL, H.
Zur Frage des nichtvirösen Kartoffelabbaues. (**The problem of potato degeneration not due to a virus**).
Bodenkultur, Wien 1950 : **4** : 152–60.

The various types of potato degeneration found in Austria are described. In the dry warm regions of eastern Austria, where degeneration is usual, considerable differences are found between the virus resistance of individual varieties and their behaviour as regards degeneration, a fact which would point to the occurrence of degeneration of non-virus origin. It is not known whether the decrease in yield due to this kind of degeneration is irreversible, but it is known that the influences due to environment in a given district are not the only factors involved.

411. RATERA, E. L.
Observaciones sobre la floración de variedades cultivadas de papas (*Solanum tuberosum* L.) y de especies silvestres argentinas. [**Observations on the flowering of cultivated varieties of potatoes (*S. tuberosum* L.) and of wild Argentine species**].
Rev. Fac. Agron. B. Aires 1950 : **12** : 253–58.

Brief notes are given on the flowering period, abundance of flowers and fruit set of ten cultivated varieties of potato and twelve wild Argentine species.

412. SANZ DE CORTÁZAR, C.
Observación de la esterilidad en algunas papas. (**Observations on the sterility of some potatoes**).
Agric. Téc. Chile 1949 : **9** : 99–114.

Tables are presented giving the frequency of flowering, set of berries, quantity and quality of the pollen, and crossability of 262 potato varieties maintained at the Centinela Experimental Station, Chile.

413. SIEBENGA, J.
De stamselectie als grondslag voor de toekomstige poterteelt. (**Line selection as the basis of future cultivation of seed potatoes**).
Maandbl. Landbouwvoorlichtdienst, 's-Gravenhage 1950 : **7** : 231–40.

Line selection is discussed with special reference to the certifying scheme and an historical account is given of the development of the present scheme. A new class of seed S is

proposed, which is tested serologically and from which A seed can be grown for not more than two or three years. After this new S seed must be used. Rate of multiplication and areas plantable after varying numbers of years are calculated.

414. Lansade, M.
Flétrissement bactérien et comportement des variétés de pommes de terre. (**Bacterial ring rot and the behaviour of varieties of potatoes**).
Pomme de Terre Française 1950 : **13** : No. 132 : 9–11.

The degree of resistance and susceptibility of different varieties of potatoes to *Corynebacterium sepedonicum* was provisionally determined, and the nature of resistance is tentatively considered. The only immune variety mentioned is Furore.

415. Jermoljev, E. and
Sethofer, V.
Zkušenosti nabyté přizjišťování vzdornosti brambor k aktinomykose. (**Experience gained during the study of potato resistance to common scab**).
Ochr. Rost. 1949 : **22** : 204–25.

Results are reported of Czechoslovak trials of potatoes for resistance to common scab. The varieties Triumf [Triumph], Krasava [Beautiful], K. Ledvinky, Eersteling, Carmen, Bojar, Kardinál [Cardinal] and Kitting were infected with 13 different races of *Actinomyces*. These races varied in virulence depending upon the variety of their host and on their adaptability to external conditions.
All potato varieties showed some capacity for resisting the disease, but none was immune to it. Kardinál proved near-resistant to common scab.
A method for determining the resistance of potatoes to the disease, including their infection with mixtures of the more active races of *Actinomyces*, was developed. There was no antagonism between the different races of the fungus or between these races and *Azotobacter*.

416. Hollis, J. P. and
Goss, R. W.
Factors influencing invasion of potato by *Erwinia carotovora*.
Phytopathology 1950 : **40** : 860–68.

The ten potato varieties used in the experiments showed significant differences in susceptibility to the pathogen.

417. Schick, R.
Sobre el comportamiento de "*Solanum demissum*," "*S. tuberosum*" y sus híbridos, contra ciertos biotipos de "*Phytophthora infestans*". (**The behaviour of *S. demissum*, *S. tuberosum* and their hybrids towards certain biotypes of *Ph. infestans***).
Agronomía, Lima 1949 : **14** : 97–101.

This is a Spanish translation of the work reviewed in *Plant Breeding Abstracts*, Vol. III, Abst. 236.

418. Rudorf, W. *ET AL*
The breeding of resistant varieties of potatoes.
Amer. Potato J. 1950 : **27** : 222–35.

A general historical survey of breeding for resistance to late blight is given. The results of investigations on biotypes of *Phytophthora infestans* carried out at the Max Planck Institute

for Researches in Plant Breeding at Müncheberg during 1936–45, and during 1947–48 at Voldsagen after the transfer of the institute, are surveyed. In selecting for resistance the following methods are used at present: (1) observation of incidence of late blight in the field, (2) artificial infection of young seedlings, (3) control with cuttings from them, and (4) supplementary test of the tubers. Commercial varieties now grown in Germany have been classified for their reaction to late blight and suitability as parents in hybridization. The cultivated varieties are divided into two groups: those originating from *Solanum tuberosum* or *S. andigenum*, and hybrid varieties involving *S. demissum* in their origin. The latter potatoes are further divided into a group of very susceptible varieties lacking major genes for resistance, and a group comprising varieties with different degrees of resistance which may be used as differential varieties in work on specialization of *Ph. infestans*.
In addition, wild species have been classified according to their reaction to 8 biotypes. The following are listed as completely resistant to all biotypes: *S. polyadenium*, *S. demissum* var. *tlaxpehualcoense*, *S. demissum* Lindl. 029, *S. demissum* El Desierto Redd. 530, and selected lines of *S. verrucosum*, *S. Antipoviczii* and *S. ajuscoense*. It is noted that on one occasion light infection occurred on *S. demissum* var. *tlaxpehualcoense*, *S. demissum* Lindl. 029 and *S. polyadenium*. The genetics of the resistance of these species and suitability for hybridization are discussed. Finally, the results of recent tests of hybrid clones for reaction to late blight are summarized.

419. Müller, K. O.
Affinity and reactivity of angiosperms to *Phytophthora infestans*.
Nature, Lond. 1950 : **166** : 392–95.

A hypothesis on the nature of resistance to *Ph. infestans* in proposed, as a result of the author's work on *Solanum* spp. and other angiosperms. The persistence of the host cell affected by the fungus in eusymbiotic host-parasite relationships is due, it is suggested, to a temporary metabolic concordance between the two partners; in this case the metabolism of the parasite fits in with that of the host cell. If, however, insufficient concordance is present the physiological unity of the affected host cell breaks down rapidly, with the simultaneous appearance of unspecific "phytoalexins" developed in the host tissues, which act as antibodies. The sensitivity of the host cell determines the specific behaviour of the host to the parasite, it is argued; the function of genes for "resistance" is only that of determining when and with what velocity the unspecific defence necrosis begins. Affinity and reactivity to *Ph. infestans* are characters which may be possessed by many members of Angiospermae regardless of the phylogenetic position of the plants in question.

420. Callbeck, L. C.
Late blight of potatoes and its control.
Fmrs' Bull. Canad. Dep. Agric. 1950 : No. 162 : Pp. 15.

Reference is made to the development of resistant varieties. Promising blight resistant strains have been produced and are being multiplied for extensive trials throughout Canada.

421. Black, W.
Inheritance of resistance to blight (*Phytophthora infestans*) in potatoes: strain C and its relationships.
Proc. Roy. Soc. Edinb. 1949–50 : **64** : 216–28.

An account is given of experiments on the genetics of resistance to strains A, B and C of *Ph. infestans* in varieties and seedling progenies having blight resistance derived from *Solanum demissum*. Three major independent genes, *Rc*, *Rb* and *Rbc* confer resistance to A and C, A and B, and A, B and C, respectively. Deviations from standard Mendelian ratios are attributed to the action of incompatibility genes.

422. Müller, K. O.
Hypersensitivity and tumour development in potato tubers in response to infections with *Phytophthora infestans*.
Nature, Lond. 1950 : **166** : 231–32.

When inoculated with parabiontic strains of the late blight fungus, F_2 forms of a cross between a W variety and a common variety of potato produced tumours. It is thought that this tumour formation is linked with hypersensitivity to the parasite, because such a reaction has not been observed in the case of a hyposensitive* (susceptible) genotype. The hypertrophic growth of the affected tissues is caused by the enlargement and multiplication of the cells surrounding those which have been destroyed by the parasite; these enlarged cells which lose their starch content seem to be identical with normal gall cells. Occasionally the fungus fructifies sparsely on the tumours, a condition never found in normally reacting tissues of hypersensitive genotypes. The following explanation is suggested. In addition to the gene *R* which controls the degree of sensitivity of the affected tissues to the invading fungus, there is another gene which enables the cells to grow and divide in response to the influence of substances released by the dying tissues. The observations indicate that this capacity of the host to react in the manner reported is a stage beyond that of hypersensitivity in the phylogenetical development of the plant types concerned.

423. Ylimäki, A.
Kampen mot potatiskräftan. (**The battle against potato wart disease**).
Forsknings- o. FörsResult. 1950 : **2** : 18–20.

An account is given of the incidence of wart disease in Finland and the available selection of late, mid-late and early varieties of potatoes, with notes on their resistance or susceptibility to wart and other diseases.

424. Tauböck, K.
Untersuchungen zur Frage der niederösterreichischen Kartoffel-Gesundgebiete und zur Züchtung aphidenresistenter Kartoffelsorten. (**Investigations on the problem of the healthy areas for growing potatoes in Lower Austria and on the breeding of aphid resistant potato varieties**).
Bodenkultur, Wien, 1950 : **4** : 145–51.

The author shows how by studying the differences in the density of aphid populations in various areas conclusions may be drawn as to which are healthy areas for potato growing. In 1949, in Lower Austria, systematic counts and estimations of aphid populations were made in the known healthy districts and in those where degeneration is usual. Tables showing the differences in the degree of infestation of several varieties are given.
The differences in aphid infestation found in the various districts and in different varieties and in varieties of different provenance should be studied further, especially by culture experiments with aphids, to obtain results as a guide in breeding varieties resistant to virus vectors and in preventing the spread of degeneration.

425. Torka, M.
II. Breeding potatoes with resistance to the Colorado beetle.
Amer. Potato J. 1950 : **27** : 263–71.

Studies on the reaction of wild *Solanum* species to the Colorado beetle undertaken in France in 1936 with the collaboration of French and German investigators, are outlined. After

* "Hypersensitive" in the original owing to a printer's error.

the outbreak of war, the research begun in France was carried out in Germany at the Colorado Beetle Research Station of the Biologische Reichsanstalt, now at Mühlhausen, Thuringia, and at the Colorado Beetle Station of the Max-Planck-Institut für Züchtungsforschung, Baden. At the former station different strains of *S. demissum* and their hybrids with *S. tuberosum* have been tested for resistance. At the latter station work on beetle resistance has comprised: (1) examination of further wild species, (2) tests of the resistance of hybrids between wild species, (3) detailed study of *S. chacoense*, the resistance of which had not been evident in France, and (4) investigation of the transmission of genes for resistance from wild species to hybrids with *S. tuberosum*. A list of the wild species tested, indicating their reaction, is given. The behaviour of the hybrids *S. demissum* x *S. chacoense*, *S. chacoense* x *S. Macolae*, *S. chacoense* x *S. polyadenium* and *S. demissum* x *S. verrucosum* towards the beetle is described.

Resistance in *S. chacoense* appears to be quantitatively inherited, with several factors conditioning resistance. A special advantage of *S. chacoense* over *S. demissum* consists in its very strong effect of deterring the larvae and beetles from eating; the chemical basis of this deterrent character is not yet known.

The results obtained from hybrids of *S. chacoense* x *S. tuberosum* indicate that almost without exception, self pollination within resistant hybrids is necessary in order to maintain resistance; back-crossing with *S. tuberosum* is of no practical value because of the difficulty of producing hybrids with both resistance and the capacity to produce tubers comparable in quantity and quality to those of commerical varieties. A serious disadvantage of *S. chacoense* hybrids is their susceptibility to *Phytophthora infestans*; this is being counteracted by hybridization with late blight resistant strains. Resistance to the Colorado beetle in *S. polyadenium* x *S. tuberosum* hybrids has so far proved inadequate and must be increased considerably. A special advantage however of these hybrids is their good yielding capacity; they frequently give yields comparable with those of European varieties.

426. Toxopeus, H. J.
The significance of resistance in tuber-bearing wild *Solanum* species for the breeding of a commercial potato resistant to the Colorado beetle.
Progress Report for the meeting of the C.E.Z.A.*at Wageningen 12th September, 1949. Pp. 7. (Mimeographed).

The report, presented to the meeting of the CEZA held at Wageningen in September 1949, summarizes the results of breeding work on resistance to the Colorado beetle in Germany and the Netherlands. The results of investigations at the Institute for Breeding Agricultural Crops, Wageningen, indicate that breeding for resistance, using *Solanum demissum* as the source of resistance, may give results of practical value, provided the test for resistance applied to the F_1 of the cross between *S. tuberosum* and *S. demissum* and the back cross of this hybrid to *S. tuberosum* is sufficiently severe and only the plants surviving this test are utilized in further breeding. Only plants on which 80–100% of the larvae die have been retained in breeding at Wageningen. Back crosses of the resistant hybrids with *S. tuberosum* have not yet been tested. The wide variation in beetle resistance shown by the F_1 plants is explained on the grounds of the high degree of heterozygosity of *S. tuberosum*; the basic resistance inherited from *S. demissum* must be greatly influenced by modifiers from *S. tuberosum*. Work in Germany has given less promising preliminary results; this portion is ascribed to the lack of selection of the most resistant plants in the F_1 of hybrids between *S. tuberosum* and *S. demissum* for back-crossing.

Work by Torka in Germany in which the value of *S. chacoense* in breeding for resistance to the Colorado bettle has been studied is examined. The author suggests that in view of the total loss of resistance after each back cross to *S. tuberosum*, the best procedure is as follows: cross a highly resistant clone of *S. chacoense* with a large number of valuable clones

* Comité Européen d'Études de Zoologie Agricole (European Committee for the Study of Agricultural Zoology).

of *S. tuberosum*, breed from each of these crosses some resistant F_2 seedlings with good tuber setting, and intercross these F_2 plants to combine desired commercial characters with Colorado beetle resistance; if necessary further intercrossing can be carried out. The value of *S. Macolae* in breeding for beetle resistance is being explored at Wageningen.

427. Dionne, L. A.
Methods used in 1948 for testing for aphid resistance in potatoes.
Rep. Ent. 79th Soc. Ont. 1948 (1949) : 19–21.

Two successful techniques have been devised at the Dominion Entomological Laboratory, Fredericton, N.B., for screening large populations of potato seedlings with regard to aphid attack. In the first, each row of seedlings is grown in the field, adjacent to a row of the highly susceptible variety Katahdin. Selections from the field are then planted in pots in the greenhouse, artificially infested with aphids and again compared with Katahdin; very few seedlings have survived the greenhouse test. The second method involves the use of small, organdie covered cages of wire, each of which completely encloses a single terminal leaflet. So far, no permanent resistance to aphid has been discovered. *Solanum polyadenium*, at one time thought to be immune, has proved very susceptible under some field conditions.

428. Jähnl, G.
Ergebnisse der Kartoffelversuche des Jahres 1949. (**Results of the potato trials of the year 1949**).
VersErgebn. Bundesanst. Alp. Landw. Admont 1950 : No. 4 : Pp. 30.

The potato trials made at the Federal Institute for Alpine Agriculture at Admont, in Austria, are described. Early and late varieties were tested as regards yield, starch content, resistance to diseases, flowering, vegetative growth of the plants and morphological characters of the tubers.

429. Madec, P.,
Perennec, P. and
Titard, A.
Expérimentation de variétés de pommes de terre dans la moitié nord de la France. (**Testing varieties of potatoes in the northern half of France**).
Bull. Techn. Inform. Ingén. Serv. Agric. 1950 : No. 51 : 475–85.

The results of these trials of French and foreign imported varieties in northern France have not demonstrated the complete superiority of any of them to the controls. A table is included showing the origin, shape, eye type, colour of tuber and flesh, resistance to wart, mildew and degeneration and the cooking qualities of the varieties tested. Several new varieties, some of which are French, have been included in the trials in 1949 and 1950 and it is hoped that some may replace Saucisse, Industrie and Institut de Beauvais.

430. Cohen, A.
(**Sweet potato culture**).
Hassadeh 1950 : **30** : 425–27.

The variety Horod is mentioned as having given the highest yields in Israel so far. The importance of finding new varieties with tubers of an even higher starch content and lower sugar content is stressed.

431. Lisboa, A.
A batata doce e sua cultura. (**The sweet potato and its cultivation**).
Ministério da Agricultura, Rio de Janeiro 1949 : Pp. 59.

Descriptions are included of Brazilian varieties.

432. Elmer, O. H.
Sweet potatoes in Kansas.
Bull. Kans. Agric. Exp. Sta. 1950 : No. 341 : Pp. 61.

The occurrence of transmissible variations and their utilization by means of selection are discussed and the new varieties Orange Little Stem, Rols and Orlis which each arose by a series of mutations from Little Stem Jersey, and Nancy Gold and Red Nancy from Nancy Hall, are described.
Orange Little Stem has darker bronze skin than the parental variety and light orange flesh due chiefly to carotene, is oblong with blunt ends and keeps well.
Rols has red skin and has given rise to a further mutant with darker red skin. Work is in progress to develop strains with higher carotene content. The roots are similar in type to Orange Little Stem.
Orlis was selected for resistance to root cracking and for other desirable characters including high carotene content from an intensely orange fleshed mutant of Little Stem Jersey. The roots have reddish bronze skin and dark orange flesh and are oblong with blunt ends. The carotene content of Orlis Strain 3561 is 11·21 mg. per 100 grm. fresh weight of the cooked roots, which is more than double that of Orange Little Stem or Rols and nearly nine times greater than that of Little Stem Jersey. It also yields more than Orange Little Stem, which equals or exceeds Little Stem Jersey in yield. Orlis has been released to growers in New Jersey under the name Jersey Orange.
Nancy Gold, which arose by a series of mutations from Nancy Hall, has dark orange flesh, which is visible through the epidermis, producing a light rosy tan skin colour, and has a carotene content of 9·57 mg. per 100 grm. as compared with 1·79 mg. for Nancy Hall. Ascorbic acid content is rather lower and yielding ability as high as or higher than for Nancy Hall. Marketable roots are produced comparatively early.
Red Nancy consists of red skinned mutants of Nancy Gold. It has deep orange flesh and high contents of vitamins A and C as compared with Nancy Hall. The roots are more regular in shape, smaller and more numerous than those of Nancy Hall and Nancy Gold. Yielding ability is equal to that of Nancy Gold.
The disease resistance of varieties is discussed and reference is made to breeding for resistance to soil pox and other diseases in southern USA.

433. Vladimirov, I. F.
(**The prospects for the cultivation of the sweet potato in the Kuĭbyšev province**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 62–63.

At the Kuĭbyšev Botanical Garden trials are reported of the variety 6, bred at the Uzbek Vegetable Research Station and producing pink tubers, and of a white tubered variety Norton. Both sweet potatoes were adapted to the conditions of Kuĭbyšev. The yield of variety 6 was 1170 grm. per plant, which was 50 grm. more than that of Norton. The variety has an additional advantage over Norton in that it lends itself to mechanical harvesting because of its compact clusters.

434. Nusbaum, C. J.
Internal cork of sweet potatoes.
Bull. S.C. Agric. Exp. Sta. 1950 : No. 381 : Pp. 23.

Among the starch varieties, Triumph, L–81, B–38 and L–5, when exposed to natural infection, showed no internal cork, though they exhibited leaf symptoms. Among the

table varieties, L–7, B–513, B–577 and B–219 similarly had no internal cork; Porto Rico was very susceptible.

435. Hernandez, T. P.,
Miller, J. C. and
Fountenot, J. F.
Studies of plant production of sweet potatoes including the effects of chemical treatments.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 423–26.

Data on plant production in 15 industrial type varieties and seedlings are presented.

FIBRES

436. Brown, M. S.
Cotton from Bikini.
J. Hered. 1950 : **41** : 115–21.

Seeds of the commercial cotton Acala 911 (*Gossypium hirsutum*) were exposed at the time of the explosion of the first atomic bomb detonated at Bikini, and an analysis was made of chromosomal changes in plants grown from the exposed seed, mainly on the basis of metaphase associations at the first meiotic division of the pollen mother cells. The chromosome configurations observed resembled those occurring in material exposed to X-rays or other sources of ionizing radiation. Fragmentation, loss of whole chromosomes and translocation of chromosome parts were detected; possibly gene mutations and minute chromosomal rearrangements and deletions were also produced. With few exceptions, the plants grown from the exposed seed were as vigorous as plants grown from unexposed seed and morphologically indistinguishable from them.

437.
Empire Cotton Growing Corporation. Report of the Administrative Council of the Corporation submitted to the Twenty-Ninth General Meeting on June 16th, 1950 : Pp. 23.

A survey of cotton breeding and selection work in the various countries is included (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2422).

438. Balasubrahmanyan, R.
V. Ramanathan. An appreciation.
Indian J. Genet. Pl. Breed. 1950 : **9** : 45–46.

An outline is presented of V. Ramanathan's work with cotton which included the breeding of several new varieties.

439.
Las estaciones experimentales y la producción y distribución de semilla de algodonero para siembra en la Argentina. (**The experiment stations and the production and distribution of seed cotton for sowing in Argentina**).
Bol. Produc. Fomento Agríc. 1950 : **2** : No. 8 : 2–13.

In 1948 for the first time part of the area under cotton in Argentina was sown with varieties produced by the local breeding stations and it is expected that their cultivation will gradually spread. This will require a well organized system of seed production and the systems employed in other countries such as the USA, Brazil and Peru are examined. There follows a description of the system instituted in Argentina by decree in 1948. The foundation seed is provided by the experiment stations of the Ministry of Agriculture,

which are responsible for maintaining pure stocks of the varieties grown. The first multiplication is done in official multiplication plots and by growers under the supervision of the experimental stations.
Data for the 1947–48 season show that 3·5% of the area was occupied by lines produced in Argentina. The most popular varieties were Deltapine 12 and 14, which accounted for 67·1% of the area. By 1951/52, according to the present plan, the area under local varieties will have increased to 33%; Deltapine 12 will be withdrawn, on account of its lateness, low yield and short lint, and Deltapine 15 will be added to the varieties recommended. Stoneville 5A will be replaced by the local variety Las Breñas 16, and in the centre of the Chaco with its variable climate and risk of drought, the Sáenz Peña selections, which are early, reliable yielders with high ginning outturn, though somewhat low in lint length, will be introduced. In the irrigated zones, the Wilds at present grown will be replaced by Coker Wilds 18 and the selection Catamarca 321.

440. HUTUKAITI, S.
A new method for artificial germination of cotton pollen.
Proc. Imp. Acad. Japan 1942 : **18** : 97–99 [from Jap. J. Bot. 1943 : **12** : Abst. 140].

A germination percentage of 55 to 68% was obtained as follows. A thin layer of sucrose agar medium was dried by an electric fan and then distilled water was added and the excess wiped off with blotting paper. Pollen grains were placed over this layer, the upper surface of the medium being inverted over water to prevent drying.

441. KHAN, A. H. and AFZAL, M.
Natural crossing in cotton in western Punjab. IV. Agents of natural crossing.
Agron. J. 1950 : **42** : 236–38.

The chief agents bringing about natural cross pollination of cotton at Lyallpur (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1761) have been found to be insects, chiefly *Apis dorsata*, *Anthophora confusa* and *Elis thoracia*; wind pollination does not occur.

442. BRAIN, S. G.
Heritable relationships of brown lints in cotton.
Agron. J. 1950 : **42** : 188–91.

A study was made of five phenotypically distinct varieties of Upland cotton (*Gossypium hirsutum*) with brown lint and one brown linted variety of *G. barbadense*. The Upland varieties Algerian, Texas Rust, Arvin and Nankeen were found to carry members of the same series of alleles for lint colour. Lint colour in the remaining Upland variety, Brymer, is controlled by a gene at another independent locus. The locus for lint colour in Nankeen is non-homologous with the locus for lint colour in Mohaux (*G. barbadense*). Additional investigations are to be carried out before symbols are proposed for the genes determining brown lint colour.

443. KHADILKAR, T. R.
Graphical representation of Khandesh cotton breeding work done during 1921 to 1948.
Poona Agric. Coll. Mag. 1950 : **41** : 54–56.

A graphical indication of the trend in economic characters of the cotton strains developed in Khandesh is provided. Notes are also given on the morphological characters of the strains concerned, which comprise the local cotton, Banilla, Jarila, NR6 and 197–3.

444. GREEN, J. M.
Variability in the properties of lint of Upland cotton.
Agron. J. 1950 : **42** : 338–41.

Phenotypic variation in lint characters was determined in about 400 strains of *Gossypium hirsutum* in the cotton collection maintained at the Mississippi Agricultural Experiment Station. Variation in lint characters shown by five local varieties grown commercially was also analysed and compared with the total variation found in the collection. In the case of length, fineness and strength the five local varieties used as controls have become stabilized near the mean of the entire sample. Effective selection for lint per cent has raised the control varieties well above the mean. Further improvement of this character will depend upon gene recombinations, provided a physiological upper limit has not already been reached. Although measurements were based on an unreplicated planting, the total range observed for each of the fibre characters studied indicated the presence of an important amount of genetic variance.

445. MOORE, V. P. and
DICK, J. B.
Test quality of cotton four generations removed from breeder's foundation seed.
Miss. Fm Res. 1950 : **13** : No. 5 : 1, 2.

An account is given of a study of the deterioration in quality of successive generations of two varieties of cotton. Even with very careful growing, handling and ginning, the spinning quality decreased.

446. AFZAL, M. and
KHAN, A. H.
Natural crossing in cotton in western Punjab. III. Methods of checking natural crossing.
Agron. J. 1950 : **42** : 202–05.

Three types of barrier were tested at Lyallpur as a means of preventing natural crossing under ordinary field conditions: allied varieties, open space and sorghum. The growing of allied varieties side by side provided the most effective barrier in the case of both local and American cottons.

447. BALLS, W. L.
Breeding millions in Egypt.
Emp. Cott. Gr. Rev. 1950 : **27** : 163–71.

The forecast of changes in the cotton varieties grown in the delta of Egypt made by the author in 1939 for a seven year period and the actual changes which occurred are outlined. In general a doubling of the profit obtained by cotton growers in the delta has resulted from breeding work at Giza. The problem encountered by the cotton breeder in identifying potentially high yielding parents in a population is stressed. The standard deviation of yield per plant is about 35% and therefore in itself the yield of any one plant has no genetical meaning; the problem is thus physiological rather than genetical and methods are needed which will diminish the variance from plant to plant, e.g. growth on artificial homogeneous "soils."
Although there is need of a more rapid and precise method with which to predict varietal yield under various soil conditions, to correspond with the prediction of market values, it is considered that at present there is no sign that the limit of improvement of cotton varieties for the delta has been reached.

448.

Empire Cotton Growing Corporation. Report of the Twenty-Ninth Annual General Meeting, held on Friday, 16th June, 1950 : Pp. 11.

The report includes an address given by R. L. Knight on breeding work carried out in the Sudan to introduce resistance to blackarm, leaf curl and jassid in Sakel cotton. A type resistant to both blackarm and leaf curl is now under trial. Types of Sakel have also been produced with long dense hairs and immunity from jassid attack. It is expected that in about three years' time, a variety of Sakel combining satisfactory commercial quality, resistance to blackarm and leaf curl and immunity from jassid will have been developed.

449. Moskovec, S. N.
(The resistance of cotton to diseases).
Agrobiologija (Agrobiology) 1950 : No. **3** : 148–51.

Comparative trials of resistance of *Gossypium hirsutum* varieties to gummosis and *Verticillium* wilt at the Azerbaĭdžan Scientific Research Institute of Agriculture are reported. The varieties tested were 8517, S–3173, 1306–DV and 108–F, all being obtained from both Uzbekistan and Azerbaĭdžan.
The trials showed that the plants of the same variety grown from seed originating from Uzbekistan were less susceptible to gummosis but more susceptible to wilt than cotton from seed reproduced in Azerbaĭdžan. Reference is made to similar but more striking results with *G. barbadense*.
The experiments showed that the Uzbekistan varieties in the first and second seed generations had acquired a higher degree of resistance to wilt, but become more susceptible to gummosis. The effect of external conditions upon varietal seed properties is illustrated by the example of 108–F, which had a higher seed weight when grown under Taškent conditions than when it was grown at Kirovobad.

450. Marsh, P. B.,
Guthrie, L. R.,
Bollenbacher, K. and
Harrell, D. C.
Observations on microbiological deterioration of cotton fiber during the period of boll opening in 1949.
Plant Dis. Reporter 1950 : **34** : 165–75.

Microbiological fibre deterioration at the time of boll opening was found to be mainly due to *Diplodia* and *Colletotrichum Gossypii*, both of which were associated with a general type of symptom complex designated fungus tight lock. Attempts to observe varietal differences in susceptibility to the production of tight lock resulted in the general conclusion that, while such differences very probably do exist, environmentally associated differences in the amount of leaf cover around the bolls often overshadow or mask varietal differences.

451. Fröier, K.
Odlingsförsök och växtförädlingsarbeten med lin och hampa—några aktuella resultat och synpunkter. **(Cultivation experiments and plant breeding work with flax and hemp—some results of current interest and some viewpoints).**
Lantbruksveckan 1950 : 237–51.

Though dealing mainly with various economic and other factors influencing the development of the flax and hemp industries in Sweden, this lecture contained some information of interest to plant breeders.

The aim in breeding is the production of Swedish varieties of textile plants with high yield, improved straw strength and fibre quality. Resistance to diseases is also required by flax growers. New flaxes bred at Svalöf include Gerda, Margareta and Kristina (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 651). Many unnamed Svalöf strains of similar type are also undergoing local trials in Sweden. The new varieties allow of cultivation on richer soils and Gerda and Kristina can be grown in any part of the country. Margareta is however only suitable for the most southerly districts. Though Concurrent is locally popular in Sweden, another variety with better rust resistance is needed. It is hoped that the new Dutch variety Formosa will be more rust resistant and replace Concurrent, but efforts are also being made to produce still better Swedish types by hybridization.
The best hemp Schurig från Markee now comprises two strains, one on the Swedish mainland, and the other on the island of Gotland. The two strains are mixed each year to avoid possibly undesirable effects of natural selection.
The hemp situation has been changed by the production of monecious forms, but some promising selections of diecious hemps from Rumania and Jugoslavia have been made at Svalöf and are nearly ready for multiplication. These new strains show an increased yield of stems and better quality of fibre.
Many problems relating to cultivation, harvesting and economic requirements still remain to be solved.

452. Fröier, K.
Odling och beredning av lin och hampa i Nederländerna, Belgien och Nordfrankrike. (Cultivation and processing of flax and hemp in the Netherlands, Belgium and Northern France).
Sverig. Utsädesfören Tidskr. 1950 : **60** : 117–53.

This is the full report on the information already published in shorter form in the current issue of the Swedish Agricultural Research Yearbook (cf. *Plant Breeding Abstracts*, Vol.XX, Abst. 1773).

453. Nagao, M.
Cytogenetics in the genus *Linum*.
Jap. J. Genet. 1941 : **17** : 109–16 [from Jap. J. Bot. 1941 : **11** : Abst. 479].

In the hybrid between *L. perenne* and *L. alpinum* the somatic chromosome number is 27, of which 9 chromosomes are derived from *L. perenne* and 18 from *L. alpinum*. In the heterotypic metaphase, configurations with many trivalents were observed, from which it is concluded that the parental genomes are homologous. Autosyndesis between non-homologous chromosomes is assumed to occur.

454. Sizov, I. A.
(The development of highly productive fibre flax.)
Agrobiologija (Agrobiology) 1950 : No. 3 : 70–77.

Breeding work with flax, conducted at the USSR Institute of Plant Industry, has involved Mičurinite methods and resulted in two still unnamed hybrid flaxes.
A large seeded, tall variety was obtained from the cross Tekstilščik [Textile Worker] x Egipetskiĭ Krupnosemjannyĭ [Large Seeded Egypt] K–265, the latter parent originating from the collection of the institute. The F_1, F_2 and F_3 were trained for the tall stem character at Puškin where the plants grew under conditions of long day upon good sward formed by perennial grasses. During the period of training, selection was carried out. The hybrid was taller than its taller parent, Tekstilščik, and its seed weight was higher than that of any flax standard. Hybrid plants not trained under the conditions of Puškin,

but grown in Krasnodar, had a shorter stem. Their seed weight, however, was 1·5 grm. A many stemmed variety was obtained by crossing the standard flax variety Pobeditelj [Victor] with a many stemmed central Asiatic winter flax K–2776. The male parent came from the plant collection of the USSR Institute of Plant Industry. The crosses were made at Krasnodar, but the hybrids were grown at Puškin. The F_1 was back-crossed to Pobeditelj used as a male parent. It was hoped, and the expectations were justified, that the back cross would improve the length of stem and prevent segregation in the second generation. The hybrids resulting from the back cross had 3 to 5 productive tall stems bearing between 15 and 38 seed capsules. The stems of some families were longer than the stems of Pobeditelj and taller than those of other standard varieties. The many stemmed hybrids yielded more fibre than the standard Svetoč [Torch], in spite of this variety's better fibre extraction rate. The quality of the hybrid fibre was better than that of Svetoč.

455. Walster, H. L.
Bolley's conquest of flax wilt.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1950 : **12** : 187–97.

An historical account is given of the work of H. L. Bolley in developing flax varieties resistant to *Fusarium Lini* at the North Dakota Agricultural Experiment Station.

456.
"Calchaquí M.A." nueva variedad de lino textil de la Estación Experimental Pergamino. (**Calchaquí MA, a new fibre flax from the Pergamino Experimental Station**).
Inform. Invest. Agríc. (IDIA), B. Aires 1950 : **2** : No. 32 : p. 3.

Calchaquí MA, a hybrid between two lines isolated respectively from populations coming originally from Tambov and Vologda, USSR, is recommended for its resistance to wilt and immunity to races 19 and 22 of *Melampsora Lini.*

457. Pardo Pascual, M.
Estudio comparativo de cinco variedades de lino procedentes de la estación de mejora de plantas de Wageningen, Holanda. (**Comparative test of five flax varieties obtained from the plant breeding station at Wageningen, Holland**).
Bol. Inst. Nac. Invest. Agron. Madr. 1950 : **10** : 49–73.

The varieties Percello, Concurrent, Hollandia, Formosa and Rembrandt, obtained from Wageningen, were tested at the Zaragoza experimental station. The varieties Formosa and Rembrandt were the tallest and most uniform in height; Hollandia was the shortest; Formosa was the first to flower but Hollandia was the earliest in seed setting and had the highest number of capsules per plant, seeds per capsule and total yield of seed, Formosa being the lowest in seed production. Rembrandt gave the highest yield of fibre, followed by Formosa, Hollandia, Concurrent and Percello in that order.

458.
In Oregon flax varietal trials.
Seed World 1950 : **67** : No. 5 : P. 41.

Stormont Cirrus, Holland Concurrent and Cascade proved outstanding in flax varietal trials in Oregon. Cascade is resistant to flax wilt and immune to all North American rust races; it is later maturing, grows tall and has a high fibre percentage.

459. Huhnke, W.,
Jordan, C.,
Neuer, H. and
Sengbusch, R. v.
Grundlagen für die Züchtung eines monözischen Hanfes. (**Principles for the breeding of a monecious hemp**).
Z. Pflanzenz. 1950 : **29** : 55–75.

In setting out the methods of recognizing valuable characteristics in hemp, it is pointed out that monecism should be judged by the external appearance of the plant from about eight days after flowering begins up to the time of full flowering; the changes in the expression of sex which may occur during flowering time are specially mentioned. The way to distinguish the individual sex forms is explained and the modifications which they undergo are described. The effect of sowing time, spacing, quality of soil and the removal of ♀ flowers on the expression of sex is discussed. Practical breeding methods are summarized, including a new process for extracting hemp seed when small numbers of plants are involved. Two mutations affecting the growth form in monecious plants of feminine habit are described. The author's theory of the origin of these mutants clarifies the somewhat confused nomenclature of monecious hemp forms. As regards the inheritance of monecism, the author holds that there is probably only one series of monecious forms carrying the XX chromosomes and having the feminine habit, and that the feminine habit determined by XX may be altered by mutation.
A new mutant with abundant pollen has been isolated from some strains and it seems that the breeding of pure "ideal monecious" hemp with abundant pollen will be possible, thus decreasing the danger of cross pollination by diecious hemp.
A summary is given of the results obtained in breeding suitable monecious strains for genetic study and for trials of the yields of seed and fibre. Strain 2749, the best so far, shows 98·8% of monecious plants and 97·24% of ideal monecious plants. The breeding of monecious hemp varieties suitable for various countries in different latitudes has been begun.

460. **Progress of research schemes.**
Jute Bull. 1950 : **13** : 192–96.

Varietal tests of *Corchorus capsularis* and *C. olitorius* and studies on breeding material are reported.

461. Tahata, K. and
Tetuka [Tetsuka], T.
(**On the influence of the length of daily exposure to light on the growth and flowering of certain crop plants**).
Proc. Crop Sci. Soc. Japan 1944 : **15** : 233–38.

This study includes an account of varietal differences in photoperiodic response in *Hibiscus cannabinus* and *Corchorus capsularis*.

462. Guinochet, and
Lemée, G.
Contribution à la connaissance des races biologiques de *Molinia coerulea* (L.) Moench. [**Contribution to the knowledge of the biological races of *M. coerulea* (L.) Moench.**].
Rev. Gén. Bot. 1950 : **57** : 565–93.

From a combined ecological, cytological, physiological and morphological study of ecological races of *M. coerulea*, the authors feel justified in provisionally modifying the

accepted classification of *M. coerulea* (L.) Moench. The chromosome number of ten of the twelve samples from different localities was $2n = 36$; for the remaining two $2n = 90$ was recorded but not with certainty.

SUGAR PLANTS

463. Loh, C. S.
(Wild sugar cane and plants closely related to it in Fuchien).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1949 : **3** : 57–70.

Descriptions are given of forms of the following species found in Fuchien (China): *Saccharum spontaneum*, a putative hybrid between *S. spontaneum* and *Erianthus* sp., *E. arundinaceus*, *E. Ravennae* and *Miscanthus sinensis*.

464. Stevenson, G. C.
Report on the sugar cane variety situation in Trinidad.
Bull. B.W.I. Cent. Sug. Cane Breed. Sta. 1950 : No. 31 : Pp. 10.

The report of a visit to Trinidad is presented, the object of which was to study the sugar cane varieties at present in commercial cultivation and under test and also the methods used in testing, to gain information on the behaviour of the newer B varieties from Barbados and assess the varietal requirements of the colony.

465. Honig, P.
Developments in cane sugar production since 1938.
Sugar, N.Y. 1950 : **45** : No. 9 : 23–24, 37.

Reference is made to the use of noble canes in breeding for greater resistance to diseases and pests and for better growth and higher production.

466. Fors [Jun.], A. L.
Impresiones de un viaje a la Estación Experimental de la Caña de Azúcar en Canal Point. **(Impressions of a visit to the Sugar Cane Experiment Station at Canal Point).**
Bol. Ofic. Asoc. Téc. Azucar., Cuba 1950 : **9** : 71–75.

In describing a visit to the Sugar Cane Experiment Station at Canal Point, Florida, the writer mentions that in 1949, apparently owing to the bad weather, pollen production was much below normal. Reference is also made to the Burmese cane Mbeya, a form of *Saccharum spontaneum* twice as large as any previously known; it arrows well and has already been crossed with noble canes. A number of sorghum x sugar cane hybrids are also under observation.

467. Loh [Lo], C. S. and
Wu, T. H.
[A note on (*Saccharum officinarum* x *S. robustum*) x *Miscanthus* hybrids].
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1949 : **3** : 377–86.

When F_1 hybrids of *S. officinarum* x *S. robustum* are crossed with *M. japonicus*, the awned lemma of the latter is frequently dominant. When the *Saccharum* hybrid contributed an unreduced gamete to the hybrid with *Miscanthus*, the triple hybrid more closely resembled *S. robustum* than when a reduced gamete was involved. The resemblances between the triple hybrid and *Erianthus* forms are pointed out.

468. Suzuki, E.
Cytological studies of sugar cane. 2. Observations on some POJ varieties.
Cytologia, Tokyo 1941 : **11** : 507–14 [from Jap. J. Bot. 1942 : Abst. 91].

Chromosome numbers were counted in pollen mother cells of some varieties grown in Formosa. The variety 2725 POJ had a varying number of univalents and one fragment. In 2878 POJ two to five bivalents may form secondary associations. In *Saccharum spontaneum* 48 bivalents were observed.

469. *Bremer, G.
Een kruisingsprogramma bij suikerriet berustend op chromosomenvermeerdering. (**A programme for crossing sugar cane based on increasing the chromosomes**).
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 14th Mtg. 10 April 1947, Wageningen 136–42. (Mimeographed).

Breeding work carried out at Pasoeroean, Java, is surveyed. Hybridization involving *Saccharum officinarum* and *S. spontaneum* has resulted in clones immune or highly resistant to sereh and yellow stripe. In this hybridization, use has been made of the Kassoer cane, believed to be a natural hybrid between the above two species and thus representing the first nobilization of glagah; the well-known canes POJ 2364 and POJ 2878 are the result of the second and third nobilization respectively. The main cytological characteristics of *S. spontaneum* forms and interspecific *Saccharum* hybrids are noted. The extra 40 chromosomes found in the hybrids correspond to the haploid number of noble cane. Such increases are very common in interspecific *Saccharum* hybrids; a long term programme has been drawn up with the object of developing clones with high numbers of chromosomes, which in conjunction with exceptionally favourable combinations of genes should give canes with considerably increased production of sugar.
In crosses with wild or semi-wild forms as males, the diploid number of chromosomes of the noble cane and the haploid number of the wild parent are combined. Segregation can be observed in the F_1, indicating that reduction occurs, the cause of which is the splitting of the chromosomes without division of the nucleus in the innermost triad nucleus; this process of endomitosis may also take place in the dyad, possibly with the result of tetraploidy. Like the triad the innermost dyad can become the embryo sac.
Hybridization between POJ 2878 and glagah does not result in increased chromosome number, merely $2n = 60 + 56$. Crossing between the sister cane POJ 2875 and glagah frequently produces a chromosome number of $2n = c.\ 55 + c.\ 55 + 56$ or 166 chromosomes. In the subsequent discussion, Bremer stated that the basic number of *Saccharum* is probably $x = 10$. Cane has been crossed with barley, bamboo, maize and alang-alang. Although it is not yet proved that increasing the chromosome number will result in higher yield of sugar, it does increase the chance of securing extreme variants.

470. Leung [Liang], T. C. and
Li, H. W.
(Cytological studies of sugar cane and related plants. VI. Cytological studies of related genera, species, varieties and hybrids of sugar cane).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1949 : **3** : 211–31.

Cytological investigations are reported of *Imperata cylindrica* ($2n = 20$); *Erianthus arundinaceus* ($2n = 40$); two species of *Erianthus* indigenous to Taiwan with 30 and 60 somatic chromosomes respectively; *Miscanthus sinensis, M. japonicus* and *M. transmorrosinensis* (all $2n = 38$); *Saccharum Narenga* ($2n = 30$); two forms of *S. spontaneum*

* An extended summary of this paper is on file at the Bureau.

from Taiwan ($2n = 96$ and 112 respectively); a series of hybrids involving sorghum, *M. japonicus* and *S. robustum* on the one hand, and cultivated sugar canes on the other; and a series of standard sugar cane varieties regarded as promising for Taiwan.

471. Li, H. W. and
Leung [Liang], T. C.
(Cytological studies of sugar cane and related plants. V. Three-way hybrids between *Saccharum officinarum*, *S. robustum* and *Miscanthus japonicus*).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan **1949** : **3** : 177–94.

The cytology of two hybrids is described, viz. (POJ 2883 x *S. robustum*) x *M. japonicus* and (F 108 x *S. robustum*) x *M. japonicus*. The former hybrid had $2n = 109$ chromosomes with 11–23 or more univalents but few or no multivalents during meiosis, suggesting chromosome homologies between *Miscanthus* and *Saccharum*. The second hybrid had 70 chromosomes, with about 20 univalents, 25 bivalents and none to one or two multivalents.

472. Leung [Liang], T. C.
(Cytological studies of sugar cane and related plants. VII. Hybrids between *Saccharum officinarum* and *S. Narenga*).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan **1949** : **3** : 259–68.

A series of hybrids between sugar cane varieties and *S. Narenga* were made, one of which, POJ 2878 x *S. Narenga*, was subjected to a detailed cytological study. This hybrid had 78 chromosomes; at metaphase there were 9–25 univalents and 0–4 multivalents. The latter suggest a certain degree of homology between the chromosomes of the two species.

473. Abbott, E. V.
Some observations on sugar cane flowering and seed production in Louisiana and an experiment on production and storage of true sugar cane seed.
Sug. Bull. N.O. 1950 : **28** : 329–31.

Observations on the extensive flowering of commercial sugar cane varieties which occurred in Louisiana during the autumn of 1941 and 1949 and on the flowering of wild forms of sugar cane are recorded. Among the factors that may possibly affect flowering, apart from day length, are abnormally high temperatures coincident with shortening length of day, and excessive moisture. Prior to the winter of 1949–50 there appears to be no record of production of viable seed by any commercial variety grown at the US Sugar Plant Field Station, Houma. In the autumn of 1949, CP 36/105 bloomed in both commercial fields and experimental plots. At Canal Point this variety has bloomed and been used as a male parent every year since 1946; several other varieties have bloomed in this locality.
Storage of seed at 0°C. has been found to be a very satisfactory method, apparently entailing no loss of viability even after a storage period of one year. The method should prove useful as a means of conserving excess seed from good breeding seasons for at least a year, during which time evaluation of seedlings derived from the new combinations can be made in the field.

474. Balch, R. T. and
Ventre, E. K.
Composition and clarification characteristics of juice from some of the newer varieties of C. P. canes.
Sug. Bull. N.O. 1950 : **28** : 325–27, 332–33.

Information is given on the composition and clarification characteristics of the varieties CP 34/120, 36/105, 43/47, 44/101, 44/155, 46/51 and 46/193.

475. Chen [Ch'ên], N. S.
Report on newly developed varieties of sugar cane. I.
Kan Chê Yen Chiu (Sugarcane Research) Taiwan 1949 : **3** : 417–21.

Notes are presented on the composition of the juice and the yield of cane and sugar of the following recently bred varieties: PT46–144 (PT41–1114 x F108); PT46–190 (F105 x Ta8); PT46–220 (PT41–666 x Ta12); PT46–58 (PT28–71 x PT27–52); and PT46–93 (T28–71 x Co356). All these varieties have outyielded the standard varieties grown in Taiwan.

476. Kwong [Kuang], K. H.
(Report on newly developed varieties of sugar cane. II).
Kan Chê Yen Chiu (Sugarcane Research) Taiwan 1950 : **4** : 21–30.

Information is provided on the germination, tillering capacity, height, growth rate, composition of the juice and yield of the following recently bred varieties: PT41–570 (TA5 x F106); PT46–73 (PT41–1114 x TA8); and PT46–78 (PT41–666 x PT26–18).

477.
Australia seeks new cane varieties in New Guinea.
Allahabad Fmr 1950 : **24** : p. 158.

Arrangements are being made for an expedition of Queensland plant breeders to New Guinea to search for new varieties of sugar cane. Cane breeding in Queensland began as early as 1889; the Bureau of Sugar Experiment Stations started work in 1921. About 25,000 new seedling varieties are now raised each year. Mention is made of some of the varieties which have been produced.

478. Mukherjee, S.
Studies on *Saccharum spontaneum* and allied grasses.
Indian J. Genet. Pl. Breed. 1949 : **9** : 47–58.

In view of the importance of *S. spontaneum* in sugar cane breeding and the large amount of variation in morphology, ecology and chromosome number found within the species, a systematic survey and collection of the various forms of *S. spontaneum* and other species of *Saccharum*, *Erianthus*, *Sclerostachya*, *Narenga* and allied genera of grasses from the different geographical regions of India have been undertaken by the Sugarcane Breeding Station, Coimbatore. The observations made so far are presented in this paper.
A total of 215 types have been collected, of which 125 belong to *S. spontaneum*. Some of the characters found in *S. spontaneum* which are likely to be useful in breeding work are drought resistance, resistance to water logging, resistance to salinity, disease resistance, adaptation to high rainfall, erect habit, tallness, profuse tillering, fast growth, protogyny, high sucrose content of 8 to 9·9% and frost resistance.

479. Staub, S.
Report on a mission to France, England, South Africa and the U.S.A.
Rev. Agric. Maurice 1950 : **29** : 114–36.

None of the five best sugar cane varieties bred at Canal Point and now under cultivation in Louisiana, viz. CP44/101, CP44/155, CP36/105, CP34/20 and CP29/166, would seem to be useful for growing in Mauritius. They could be used for breeding work but an alternative way of securing CP germplasm would be the importation of fuzz.

480. H., C. G.
The disease resistance of approved cane varieties.
Cane Gr. Quart. Bull. 1950 : **14** : 44–45.

A table is given indicating the degree of resistance of approved varieties to red rot, Fiji disease, downy mildew, leaf scald, gumming, top rot, chlorotic streak and mosaic.

481. Hughes, C. G.
Testing sugar cane varieties for resistance to disease.
Cane Gr. Quart. Bull. 1950 : **14** : 16–19.

Methods used in Queensland for testing the disease resistance of sugar cane varieties are outlined.

482. Lo, T. T. and
Chi [Ch'i], C. C.
(**Disease resistance tests with PT43-52**).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1949 : **3** : 393–96.

The new variety PT43–52 is resistant to most of the fungus and virus diseases affecting sugar cane in Taiwan except chlorotic streak, red rot and *Fusarium* top rot.

483. Chi [Ch'i], C. C.
(**A preliminary report on the study of the pineapple disease of sugar cane**).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1949 : **3** : 71–102.

Data are included on varietal differences in the susceptibility of sugar cane cuttings to infection by *Ceratostomella paradoxa* in Taiwan. *Saccharum spontaneum, S. Barberi* and variety F108 were the most resistant types found.

484.
Sugar cane breeding success in Mauritius.
New Commonwealth 1950 : **21** : 40–41.

A note is presented on the sugar cane breeding work in Mauritius, special mention being made of the new variety M134/32, which is resistant to drought and *Phytalus*.

485. Khanna, K. L.,
Sharma, S. L. and
Hussain, M. Z.
On *Pyrilla* infestation and varietal resistance in sugar cane.
Curr. Sci. 1950 : **19** : 251–52.

Varietal differences in resistance to *Pyrilla* have been observed at the Central Sugar Research Station, Pusa, which are associated with the microclimatic conditions depending upon the leaf shape and angle of divergence of the leaf with the stalk, and with the anatomical structure of the lamina.

486. Lo, T. T.
(**Chlorotic streak disease of sugar cane in Taiwan. II**).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1949 : **3** : 387–92.

Notes are included on varietal susceptibility of Taiwan sugar canes to chlorotic streak. *Saccharum robustum, Miscanthus* sp. and *S. sinense* are noted as failing to show the typical symptoms of infection.

487. Wu, P. C. and
Loo [Lu], P. L.
(Advanced comparative test of varieties).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1949 : **3** : 335–46.

The sugar cane varieties H 1381, POJ 3016, POJ 2883, F 108, PT 43-52 and PT 39–285 were examined during 1947–49 for percentage germination, tillering capacity, sugar yield, growth rate, root development, degree of borer injury, and percentage of dead stalks.

488. Gouaux, C. B. and
Taggart, W. G.
Test fields in the sugar cane belt—1949.
Sug. Bull. N.O. 1950 : **28** : 345–52.

A report is given on the performance of standard commercial and promising new sugar cane varieties in experimental fields at eight centres in Louisiana. In 11 out of 17 tests the recently released variety CP44/101 was superior in yield of sugar per acre to CP36–105; CP36–105 outyielded CP44/155, another recently released cane, in 13 of these tests. (cf. Abst. 159).

489. Arceneaux, G.,
Hebert, L. P. and
Matherne, R. J.
Results of sugar cane variety tests in Louisiana during 1949.
Sug. Bull. N.O. 1950 : **28** : 353–63.

The results of tests of released and unreleased sugar cane varieties at different localities in Louisiana are summarized. Of particular interest is the information obtained on the performance of the recently bred varieties CP44/101 and CP44/155. (cf. Abst. 159).

490. Simon, E. C.
Report of new cane varieties.
Sug. Bull. N.O. 1950 : **28** : 373–75.

The results of milling tests on new sugar cane varieties developed in Louisiana are reported.

491. Turner, P. E.
Researches on sugar cane agriculture in the British West Indies and British Guiana, 1949.
B.W.I. Sug. Ass. 1949 : Pp. 32.

The sugar cane soils of the British West Indies have been classified into four main groups; this classification is being used in defining the ecological requirements of sugar cane varieties.
A list is given of the 48 varieties belonging to the series B47′ which were released in 1949 from the Central Breeding Station, Barbados. Seedlings are being sent to Jamaica for testing their mosaic resistance, with a view to obtaining information of assistance to the Central Station in the breeding and selection of varieties suited to Jamaican conditions. Information is provided on the varietal situation in Barbados, St Kitts, Trinidad, Antigua, St Lucia, Jamaica and British Guiana.

492.

Sugar Bulletin No. 18.
Dep. Agric. Brit. Guiana 1950 : Pp. 58.

Knowles, W. H. C. and Cameron, C. — *Field experiments with sugar cane. XVIII.* (*pp. 1–37*).

The results of sugar cane variety trials in British Guiana are reported in detail. The varieties tested are discussed under the following categories: standard canes; Barbados seedlings produced prior to the series B40′; Barbados seedlings of the series B40′ and B41′ and Demerara seedlings of the series D1941; Barbados seedlings of the series B42′ and B43′ and Demerara seedlings of the series D1943; and Barbados seedlings of the series B44′ and recent Demerara seedlings. Varieties recommended for planting on estates comprise B37161 (B3365 x B603), D49/41 (D338/33 x Co213), D142/41 (B34104 x Co213) and B41227 (B35207 x POJ2878). The results of the variety trials suggest that B41227 will prove superior to the standard B34104. The cane B37161, the distribution of which was begun in 1947, has proved at least equal to B34104. The canes B37161 and D49/41 are recommended for planting in areas where B34104 is in danger of being planted exclusively and where material of B41227 is not yet available. The cane D142/41 is not likely to equal B41227 in yield but it has usually proved superior to B34104 in yield and possesses rich juice and good field characteristics.

Knowles, W. H. C. — *The variety and fertilizer position of the sugar industry. XV.* (*pp. 43–51*).

Information is given on the varietal composition of the sugar cane crop to be reaped in 1950 on the estates in British Guiana.

Knowles, W. H. C. — *Report on the sugar experiment stations for the year 1949.* (*pp. 53–58*).

Tables are provided indicating the breeding and introduction work carried out during 1949, listing the number of Demerara and Barbados seedlings undergoing tests and multiplication.

493.

(The 1948-49 sugar cane variety regional trials).
Kan Chê Yen Chiu (Sugarcane Research) Taiwan 1949 : **3** : 293–334.

Data are presented on the percentage germination, tillering capacity, growth rate, height, morphological composition of the stool, cane yield, sugar yield, quality of the juice and fibre percentage of 96 varieties tested at 10 different localities.

494.

Varietal experiments reaped in Trinidad in 1949.
Dep. Agric. Sug. Cane Invest. Cttee. Trinidad Pp. 16. (Mimeographed).

The results of nine trials of sugar cane varieties from Barbados are reported. Broad recommendations are made for the use of B37161, B3337, B4098 and B41227.

495. Draghetti, A.
Ottavio Munerati e la bieticoltura in Italia. (**Ottavio Munerati and beet cultivation in Italy.**
Ital. Agric. 1950 : **87** : 469–75.

This national tribute, presented on 18 June 1950 in the form of an address to an assembly of Italian scientists and officials, describes the personality and work of the late Ottavio Munerati and his great contributions to Italian agriculture.

496. Yamashita, K.
(**A hereditary character that can be used in sugar beet breeding**).
Zeit. Inst. gen. Landw. Ab. Kaiserl. Univ. Kyoto 1941 : **2** : 3–7 [from Jap. J. Bot. 1943 : **12** : Abst. 230].

Examination of a large number of varieties and individuals of sugar beet showed that, though the seedlings are either green or pale red, there are no plants that produce only red seedlings. Green is explained as a simple recessive and the green and red plants as segregates arising as a result of some earlier hybridization.
The sugar content of the red seedlings was higher than that of the green.

497. Roemer, Th. and
Czeratzki, W.
Sortenprüfung der Zuckerrüben in Deutschland seit 1920. (**Testing of varieties of sugar beets in Germany since 1920**).
Kühn-Arch. 1949 : **62** : 1–64.

A general summary is given of information relating to variety trials of sugar beet under the following headings: aims and methods of conducting variety trials; resistance of sugar beet varieties to bolting, diseases, drought, excess of moisture and frost; and the distribution of varieties in Germany and their suitability for other countries.
The newest Kleinwanzleben Aa varieties, obtained during 1935–40, though producing less seed, may be sown earlier and develop leaves earlier. Aims of future breeding which are briefly mentioned include: increasing the yield of dry substance, either as sugar or fodder material, per unit area; the production of varieties resistant to *Cercospora beticola* and to curly top; crossing *Beta vulgaris* with *B. procumbens* to obtain forms resistant to beet nematodes; and crossing *B. vulgaris* with *B. lomatogona* to produce races and forms yielding single-germ seed. The advantages and disadvantages of trying to breed polyploid races are briefly discussed.

498. Dorn, M.
Untersuchungen über eine Blattschwärze der Zuckerrübe. (**Investigations on a blackening of the leaf in the sugar beet**).
Phytopath. Z. 1950 : **17** : 85–110.

From a new necrosis in a sugar beet from Einbeck, *Alternaria tenuis* has been identified and the name "beet leaf necrosis" [Rübenblattschwärze] is suggested. Various factors affecting the susceptibility of the plant were studied. In many experiments strain E of the fungus seemed particularly virulent.

499. Gysel, A.
Über die Virusgelbsucht der Zuckerrübe. Sammelreferat. (**On virus yellows of sugar beet. Review**).
Schweiz. Landw. Mh. 1950 : **28** : 219–21.

No sugar beet variety immune to yellows is known. Breeding of resistant or even tolerant varieties is recommended.

500. Brandt, F. O.
Fünfzigjährige Erfahrungen mit der Kleinwanzlebener Doppelstandardmethode für Leistungsprüfung von Beta-Rüben. (**Fifty years experience with the Kleinwanzleben double standard method for performance tests of beets**).
Z. Pflanzenz. 1950 : **29** : 90–104.

The double standard method with evaluation by graphs has been used for sugar beet trials at Kleinwanzleben since it originated there in 1898. It permits of distinguishing relatively

small differences in performance, so that it is possible in variety tests to identify varieties from their performance, even though morphologically they cannot be distinguished.
This paper, following Schneider's in 1934 describing the method, presents it in its latest form after thorough testing, slight improvements and simplification. Full details are given showing how the calculations are made and how the graphs are used.

STIMULANTS

501. Hitier, H.
Étude génétique des caractères "énation" et "catacorolle" chez *Nicotiana Tabacum* L. (**A genetical study of the characters enation and catacorolla in *N. Tabacum* L.**).
Ann. Inst. Exp. Tabac Bergerac 1950 : **1** : 31–61.

Genetically conditioned leaf enation occurs in the tobacco lines Enation 701 and Corolle double X [Double Corolla X] which also carries the character catacorolla. A genetical analysis of both these characters was made from a study of crosses of each of the above two lines with Java, Cabot and a number of other varieties. Enation seems to be due to two double recessives *aa* and *bb* found in Java and Cabot respectively. Dominance was however incomplete and plants homozygously recessive for one factor and heterozygous for the other showed a tendency to enation.
The character catacorolla may, it is thought, have a similar genetic basis, the two recessive factors here being *c* and *d*, the first of which occurs as *cc* in Java and Enation 701. There appears to be linkage between the factors *c* and *a* and *b* and *d*.

502. Perucci, E.
Gli ibridi di prima generazione. (**First generation hybrids**).
Tabacco 1950 : **54** : 43–54, 86–95, 158–70, 204–07, 235–40.

The main advantages of using F_1 hybrid tobacco are discussed under the following heads, with illustrations from experiences in the Italian tobacco industry: rapid results; increased production; improved quality; uniformity of the crop; greater vitality of the seed; and rapid plant growth. Mention is also made of the fact that hybrid tobaccos are so early that, where they are grown on plantations with Kentucky, there is no need to construct special sheds for open air drying of the hybrids, as the same sheds, with slight modifications, can be used for both crops.
In explaining how hybrid seed is produced the best method of emasculation is described, with observations on the collection of flowers for pollen, fertilization, the organization of the work of crossing, and the difficulties to be overcome in crossing *Nicotiana rustica*.
Experiments on the period during which tobacco pollen remains viable have shown that, though pollen 15 days old might be viable, for large scale production of hybrids, pollen should not be used after the sixth or seventh day after dehiscence, i.e. the seventh or eighth day after collection. The age of the pollen was also found to affect the size of the capsule, but not the weight of the seeds.
Investigations were carried out on the length of life of emasculated flowers and on the use of parchment bags to prevent cross pollination. Apparently five days is the limit for the period during which emasculated flowers that are unfertilized can remain on the plant, and pollination should in fact be carried out by the third day.

503. Izard, C.
Contribution à l'étude cytogénétique des hybrides interspécifiques de *Nicotiana*. (**A contribution to the cytogenetic study of interspecific hybrids of *Nicotiana***).
Ann. Inst. Exp. Tabac Bergerac 1950 : **1** : 79–92.

In view of the potential practical importance of interspecific hybrids of tobacco a study was made of the following hybrids obtained at the Experimental Institute of Tobacco at

Bergerac: (1) *N. repanda* x *N. sylvestris*, (2) *N. paniculata* x *N. Langsdorfii*, (3) *N. suaveolens* x *N. glauca* and (4) *N. rustica* var. *texana* x *N. suaveolens*. In some of the hybrids amphidiploidy had been induced by colchicine treatment. Detailed descriptions are given of the plants, their sterility or fertility, pollen production and quality, and also of the course of meiosis. The third and fourth crosses yielded amphidiploid as well as amphihaploid forms (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 383).

504. Smith, H. H.
Developmental restrictions on recombination in *Nicotiana*.
Evolution, Lancaster, Pa 1950 : **4** : 202–11.

Among the features distinguishing *N. Langsdorfii* and *N. Sanderae* are length of corolla tube and of corolla limb. The F_1 of the hybrid between these two species is intermediate in corolla size and shape; in the F_2 recombination of the parental values for these two characters is severely restricted. Developmental studies were carried out and relative growth curves plotted for length of corolla tube and limb in the parental species, the F_1 and F_2. It was shown that the two species have in common a constant relationship of these dimensions to each other during the major period of ontogeny of the flower. This correlation is apparently controlled by the same hereditary factors in both species since segregation for different shapes was not found in the F_2; recombination cannot therefore be expected to occur. The possible general importance of developmental restrictions, their relation to estimating other hindrances to recombination and the difficulties of determining the exact magnitude of these effects are discussed.

505. Curcio, D. M.
La concimazione del tabacco. (**Manuring of tobacco**).
Tabacco 1950 : **54** : 268–72.

Part II of this paper includes a classification of varieties of tobacco according to specific commercial characteristics and properties required for the Italian market.

506. Henderson, R. G.
Vamorr 48 and 50; two new flue-cured varieties of tobacco resistant to mosaic and rootrot.
Va Bull. Agric. Exp. Sta. 1949 : No. 427 : Pp. 10.

The chief advantage of the new varieties of flue-cured tobacco Vamorr 48 and Vamorr 50 is their high level of resistance to root rot, due to several different soil borne organisms, and mosaic. They were developed by crossing plants resistant to mosaic with plants resistant to root rot and then outcrossing the progeny with plants of good flue-cured varieties. The two new tobaccos are similar in field appearance to Yellow Special; they yield approximately as well as this variety in the absence of root rot and mosaic and are superior to it in the presence of these diseases. In farm trials the Vamorr varieties have remained completely free of mosaic whereas all the plants of susceptible varieties were infected.

507. Marcelli, E.
Tre studi sull'oidio del tabacco. (**Three studies on *Oidium* of tobacco**).
Tabacco 1950 : **54** : 55–61.

The three studies related to: (1) the comparative morphology of the ascosporous and conidial forms of *O. Tabaci* on the *Nicotiana Tabacum* varieties Herzegovina, Kentucky and Burley; (2) specialization of *O. Tabaci* as regards tobacco; and (3) susceptibility of species and races of tobacco to the disease.

There is some evidence that the diameter of the perithecia formed on different races of tobacco may vary.
Direct inoculation of *O. Tabaci* into *Cucurbita maxima, Citrullus vulgaris, Cucumis Melo, Cucumis Anguria* and *Cucumis sativus* showed that *Cucumis Anguria* alone was immune and that only conidial forms developed on Cucurbitaceae.
In similar experiments with *Sphaerotheca fuliginea* tobacco was not infected.
Tests of eight species and numerous varieties of *N. Tabacum* showed that Burley di Gran Reddito [High Yielding Burley], Maryland di Cava [Cava Maryland] and Maryland riprodotto [Maryland Multiplication] and, as subsidiary varieties, Resistente [Resistant] 142 and Kentucky americano [American Kentucky] can be grown where *Oidium* is endemic. All the species other than *N. Tabacum* proved immune except for a slight infection on two basal leaves of *N. sylvestris*. The complete immunity of *N. glauca* and *N. alata* is in opposition to the observations of Ternovskiĭ and Osadčuk.

508. Jankowski, F.
Doświadczenia hodowlane z Kentucky co do odporności na czarną zgorzel korzeniowa. (**Breeding experiments with Kentucky as regards its resistance to black root rot**).
Tytoń, Warszawa 1950 : **6** : 13–14.

Breeding has been begun to find varieties highly resistant to black root rot and suitable for growing in infected soil and which can replace Kentucky 3002. Hitherto only the variety Kentucky x Szamoszaty 1·16 has been found markedly more resistant to the parasite than Kentucky 3002, but the quality of the leaf is unsuitable for processing.
The resistance of varieties of the Kentucky type to *Thielaviopsis basicola* was tested, using 9 Puławay hybrids of the Kentucky type, 2 varieties of American origin and 3 varieties selected in 1948 at Czyżyny. The varieties Kentucky x Szamoszaty x Puławy Szerokolistny [Broad Leafed Puławy] 118–3/46, Kentucky x Szamoszaty x Gold Leaf 1/47, Kentucky x Szamoszaty 7–5/43 and Kentucky x Szamoszaty x Puławy Szerokolistny 119–8/46 showed high resistance, especially the first three, and in all cases a large number of accessory roots were formed above the point of infection; the hybrids Kentucky x Szamoszaty x Kentucky 3002 3/46, Kentucky x Szamoszaty x Kentucky 3002 1/46 and Kentucky x Szamoszaty x Kentucky 3002 2/46 showed good growth despite a greater degree of infection than in the above mentioned highly resistant varieties. The hybrid Kentucky x Szamoszaty x Gold Leaf 1/47 is a different type of tobacco, having large oval leaves and exhibiting rapid growth and earliness.

509. Alcaraz Mira, E.
Variedades de tabaco resistentes al mosaico ordinario. II.—Nuevas variedades obtenidas. (**Tobacco varieties resistant to common mosaic. II. New varieties obtained**).
Bol. Inst. Nac. Invest. Agron. Madr. 1950 : **10** : 9–47.

In continuation of previous work (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 388), it is reported that since the immunity to tobacco mosaic (*Nicotiana* virus 1) carried by *N. glutinosa* breaks down at temperatures of 36° C. and above, it was decided that for Spanish conditions it is preferable to use Ambalema as a source of resistance. In 1933 Ambalema was crossed with the other *N. Tabacum* varieties Valencia, Kentucky, Filipino, Maryland and Habano. The first three hybrid generations were grown without selection. Plants of F_4 were infected artificially in the field and almost all proved to be susceptible, though in varying degrees. The plants with the lowest attack and best morphological type were selected and their progeny tested by artificial infection in greenhouses. The majority of the progenies proved highly resistant. A certain number of plants were completely resistant but these mostly resembled Ambalema strongly in morphological type and were useless for cultivation. Further selection work was therefore confined to the semi-resistant

group. Some selections have displayed a remarkable degree of morphological purity, particularly two from Ambalema x Valencia, designated 57–A, and one from Ambalema x Filipino, designated Hybrid 60; this last-named was the best of all in both morphology and quality of the product and was therefore taken as the starting point for further breeding work. It was crossed with Hybrid 217 (Zaharadni Bili x Kentucky), Hybrid 216 (Ialomita x Kentucky), Cantabria (a broad-leaved mutant of Kentucky), with the Filipino parent and with the resistant Hybrid 57. All but the last gave susceptible F_1 generations but certain resistant plants were selected in the F_2 and several of them gave highly resistant F_3 families much superior to Hybrid 60 in type and quality. The most promising of these are described. Other equally promising hybrids were obtained from a later series of crosses of Hybrid 60 with Habano Gigante [Giant Havanna], Habano Mallorca and a non-commercial line of var. *macrophylla*. The best of these hybrids are being further crossed with Valencia and Maryland, with the object of improving their yielding abilities.
Tests of the resistance of the later hybrids have shown it to be equal to that of Hybrid 60 and much greater than that of White Burley, derived from *N. glutinosa*. Yield data show that the resistant hybrids give a somewhat lower yield in the first crop but owing to their resistance they give a second crop which is sometimes larger than the first and their total yield per hectare is considerably greater than that of the susceptible varieties commonly grown. Particularly promising yields have been given by hybrids 230–B and 225.

510. HARLER, C. R.
Tea seed gardens.
Nyasald Agric. Quart. J. 1949 : **8** : 97–103.

Tea seed is produced from mass selected plants. The management of tea seed gardens is discussed.

511. SIMURA, T.
(Studies on the relation between cold and disease resistance in tea).
Proc. Crop Sci. Soc. Japan 1941 : **13** : 5–19 [from Jap. J. Bot. 1942 : **12** : Abst. 88].

Tea plants from India are in general resistant to red tea disease caused by *Guignardia Camelliae* but less resistant to cold, whereas in indigenous tea plants in Japan the reverse is the case, the Chinese species being intermediate in these respects. It is also known that the richer the leaves are in tannin the more resistant they are to the fungus and that poorness in tannin and richness in nitrogenous substance lead to strong cold resistance and weak disease resistance.
From the viewpoint of breeding, strains rich in tannin will be best suited to moist warm regions, where the disease is most prevalent, and strains with less tannin will be most suitable for relatively cold regions.

512. FRAHM-LELIVELD, J. A.
A statistical method for handling bulk cytological material in selection.
Ann. R. Bot. Gdns Buitenzorg 1949 : **51** : 269–73.

A method is described by means of which approximate chromosome numbers may be evaluated by measuring the diameter of metaphase plates in acetocarmine smears of young roots or young leaves, in combination with the analysis of variance. The method, which has been successfully applied to species and interspecific hybrids of *Coffea* and to *Canavallia ensiformis*, is valuable for the preliminary sorting out of extensive breeding material; further investigation of plants suspected of being types with the desired chromosome numbers should be made by the usual cytological methods.

513. Tourneur, M.
Le greffage des caféiers. (**Grafting of coffee plants**).
Bull. Agric. Madagascar 1950 : **3** : 3–7.

The use of clones, including polyclones, in coffee improvement is considered and numerous graft combinations that are being tested are listed. The great resistance of Arabica trees to *Hemileia* is pointed out.

514. Dufournet, R.
Le caféier d'Arabie dans le nord de Madagascar et l'*Hemileia vastatrix*.
(**The Arabian coffee plant in the northern part of Madagascar and *H. vastatrix***).
Agron. Trop. 1950 : **5** : 297–303.

In order to obtain resistant varieties a programme of selection and hybridization is contemplated at the Station d'Amélioration des Caféiers at Bealanana.

515.
Technical conference on cacao, held at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, September 30—October 4, 1947. Pp. 53. (Mimeographed).

Information given by delegates from the various participating countries included the following:—

Colombia
High producing types of cacao are being selected, records having been kept for over three years; these indicate that certain Criollo trees produce 3 kg. of dry cacao per year and some of the Forasteros produce 12 kg. annually. Breeding for high yield and adaptation to certain conditions is in progress at the Experiment Station of Valle de Cauca where one or more trees are in bloom all the year round and pollen for hybridization purposes can be brought by plane.

Ecuador
Several hundred promising trees in the various producing regions of the country have been located and are being multiplied vegetatively for extensive disease resistance trials. Selections from neighbouring territories, including Trinidad, have been introduced.

Mexico
In order to counteract low yield clonal selection has been started in which 150 trees have been selected from among 70,000. Preliminary studies indicate that the yield from 60 of the best selections varies between two and five tons per hectare. Most of the selections are thought to be hybrids between Forastero and Criollo; they are being propagated by budding.

Panama
The United Fruit Company, in its improvement programme, has paid special attention to the selection of high yielding trees.

Venezuela
A programme of selection of highly productive trees of good quality is being carried out. Trees considered resistant to witches' broom in Trinidad are to be imported and a search for good quality trees resistant to the disease is to be started in Venezuela. Efforts are being made to conserve the original genetic quality of Venezuela cacao and to increase the amount of such cacao.

516. Bowman, G. F.
Quality in cacao.
Cacao Inform. Bull. 1950 : **2** : No. 5 : 1–4.

The genetic diversity of cacao is discussed in relation to quality, and the advantages of producing clones from selected trees are pointed out. It would be necessary to test selections for flavour before using them for this purpose.

517. Hills, K. L. and
Rodwell, C. N.
The recombination of some varietal characters in the opium poppy.
Aust. J. Agric. Res. 1950 : **1** : 118–31.

Varieties of opium poppy having a fairly high concentration of morphine in the mature capsules and suitability for mechanical harvesting are necessary, if the new technique of direct extraction of morphine from dry poppy capsules and straw is to be commercially successful in Australia. An account is given of the results obtained with six crosses of opium poppy varieties. The cross between variety 26 (*Papaver somniferum* ssp. *indicum*?) and 37 (ssp. *subspontaneum*) was particularly successful, producing several segregates which combined increased yield, high concentration of morphine and other desirable agronomic features. Variety 34, used in a cross with 26, possesses a consistently high concentration of morphine in its husks but unfortunately its undesirable characters were dominant; it should be crossed with other varieties in the hope of discovering a more valuable combination. The remaining four crosses were studied in less detail but gave encouraging results. Equally successful results were obtained with crosses between and within subspecies. The use of Indian varieties in breeding for extreme earliness and stout short straw appears to be promising; such varieties might well form the basis of any programme designed to breed opium poppies for cultivation under dry land conditions in southern Australia.

518.
The Report of the Principal of Wye College to the Governing Body for the year 1948-9 : Pp. 56.

The building of the new hops laboratory has been completed. Most of the work referred to has been described more fully in the separate report of the Department of Hop Research (cf. Abst. 519). In addition, however, reference is made to the following investigations:—
Waxed paper bags for controlling pollination in special crosses have proved too hazardous.
The use of small flowering plants produced from cuttings of lateral shoots and grown in pots which can be moved into isolation for controlled pollination is being explored.
Information on the inheritance of the character of "golden leaf" has been obtained from a small back cross family. It is intended to breed a series of male hops homozygous for this character for use in various pollination experiments.
Colchicine treatment of the buds for the induction of polyploidy had no observable effect at a concentration of 0·1%; a 1% solution appeared to stop growth completely.
The influence of variety upon the rate of deterioration of stored hops found in previous years was confirmed.

519.
Annual Report of the Department of Hop Research, Wye College 1949 (1950) : Pp. 54.

General Report. (*pp. 5–17*).

Selection of Golding hops is in progress. Seedlings were raised from seed of the wild Japanese hops (*Humulus Lupulus* var. *cordifolius*), but only one plant, a male, was found

with entirely cordate leaves; the remainder appeared to be the result of hybridization with males of the American type. A male plant of *H. Lupulus* var. *neomexicanus* was obtained from Arizona; cuttings of a representative collection of hop varieties grown in New Zealand were also introduced. Many new seedlings are under selection.

Genetical studies. (*pp. 10–12*).

Too many seeds in hops reduce market value. Varietal variation in fecundity is therefore being studied.

Leaf gland production has been found to be a varietal character and further work is planned to test whether there is correlation between this and richness in humulone; if such a correlation exists estimation of humulone content could be made in the seedling stage. It has also been found that the number of resin glands produced in the anthers of male hop flowers differs according to the variety; experiments are being carried out to determine whether any correlation exists between this number and the richness in humulone of the cones of daughter plants arising from crosses made with pollen from the males in question. Male hops having an ancestry similar to that of female hops resistant to *Verticillium* wilt are being tested for resistance to the disease, in the hope of finding sources of resistance for breeding.

Monecious plants which occur occasionally were studied. There appear to be three main types of such plants, bearing: (1) nearly all male flowers with a female flower occasionally at the tip of the inflorescence; (2) almost equal numbers of male and female flowers; and (3) almost entirely female flowers with occasional bunches of male flowers. Out of 20 monecious plants examined only 1 was found which produced apparently fertile flowers of both sexes.

Cytology. (*p. 13*).

It was found that the hop plant has no regular period at which meiotic divisions of the pollen mother cells occur on an extensive scale. A system of sampling buds by examining single anthers squashed in acetocarmine has been successfully used for the selection of those at the required stage of development. No evidence of the presence of a heteromorphic pair of sex chromosomes was found in wild European hops, wild Canadian hops, some hybrids and *H. Lupulus* var. *cordifolius*.

Dark, S. O. S. *The cytology of the hop.* (*pp. 48–54*).

Literature on the cytology of the hop is critically examined.

520. Hamaguti, N.
(**Some investigations as a basis for breeding hops**).
Biol. Arb. Dainippon Bierbr. 1942 : **1** : 29–42 [from Jap. J. Bot. 1943 : **12** : Abst. 129].

Using Yamasaki's potassium chlorate test the author found that homozygous ♀ plants $2(8 + X_1 + X_2)$ were much more sensitive to the toxin than the ♂ heterozygote $8 + X_1X_2 + 8 + Y_1 + Y_2$. The staminate flowers open each day usually between 6 and 8 in the morning. Information was also collected on the sequence of events in the opening of flowers, the induction of root formation by β-indoleacetic acid treatment, and on some morphological features of fertilized, and the time of ripening of unfertilized, ♀ inflorescences.

521. Majewski, K.
Studia nad niektórymi cechami chmielu jako przyczynek do zagadnienia jego selekcji. (**Studies on some characters of hops, as a contribution to the problem of their selection**).
Ann. Univ. Mariae Curie-Skłodowska, Lublin-Polonia 1950 : **5** (1) Sect. E : 1–28.

Morphological, physiological and economic characters of red, green and wild types of hops are described.

The length of the vegetative period, from the time the shoots emerge to harvest time, for early, medium early, late and wild hops was found to be, respectively, 112, 116, 120 and 122 days for one year old plants and 118, 125, 136 and 143 days for two year old plants. The yield of cones per plant of early, medium early and late green hops and of wild hops was 1300, 2022, 2616 and 1444 grm., respectively.

CONDIMENTS

522. Mostovoj, K.
Uspíšení kvetení a zvýšení výnosu regulací světelného stadia u papriky.
(Hastened flowering and increased yield of paprika obtained by regulation of its light phase).
Sborn. Českosl. Akad. Zeměd. 1949 : **23** : 57–67.

The effect of short day treatments on ten varieties of paprika was studied in Czechoslovakia. There were varietal differences in response. Some varieties produced more early fruits, others a greater number of large fruits, while other plants had the same number of fruits, but the fruits were heavier. Most varieties however showed both an increase in the number of fruits and the weight of the total harvest.
Curtailed illumination hastened the flowering of most varieties, the effect being greater on early than on late varieties. Early flowering was not always associated with increased yields.
The variety Kaleidoskop [Kaleidoscope] showed a yield decrease; at the same time the plants grew taller and had many large leaves.

523. Smith, P. G.
Inheritance of brown and green mature fruit color in peppers.
J. Hered. 1950 : **41** : 138–40.

Brown colour in ripe fruit of *Capsicum annuum* is a result of the combination of normal red pigment and undecomposed chlorophyll. Retention of chlorophyll was found to be a character inherited as a simple recessive to that of normal chlorophyll decomposition; the symbols *Clcl* are suggested for the gene pair concerned. The gene pair for chlorophyll retention or breakdown is inherited independently of the gene *R* for red fruit colour and *r* for yellow colour. The F_2 of the cross between a brown fruited form and a yellow fruited variety which formed the material of the study segregated for ripe fruit colour in the ratio of 9 red : 3 brown : 3 yellow : 1 green. The green fruit colour of the double recessive for *r* and *cl* may be of value when incorporated in certain varieties of salad peppers. No evidence of linkage was found between the gene pair *Clcl* and the genes for pungency or fruit position.

524. Morgan, D. T. (Jun.) and
Rappleye, R. D.
Twin and triplet pepper seedlings. A study of polyembryony in *Capsicum frutescens*.
J. Hered. 1950 : **41** : 91–95.

The varieties Pimento, California Wonder and Goliath showed high, low and intermediate frequencies of polyembryonic seedlings. These varying frequencies appeared to reflect differences in varietal genotype. From a total of 78,005 germinated seeds 3 triplet and 291 twin seedlings were obtained. Chromosome counts revealed the following types of twin seedlings, listed in ascending order of frequency: diploid-tetraploid, haploid-haploid, conjoined diploid-diploid, haploid-diploid and unattached diploid-diploid. The triplets were composed of diploid members. The possible modes of origin of these different types are discussed, in relation to the cases of polyembryony reported by investigators of other

species. Thirty of the haploids have had their chromosome number doubled by colchicine treatment. It is suggested that utilization of haploids in developing new homozygous varieties may be of practical value. Haploids with desired types could be obtained from F_1 intervarietal hybrids and subsequently treated with colchicine; the resultant diploid would have different combinations of characters on account of the meiotic segregation in the F_1 hybrids. If one parental variety possessed the majority of favourable characters, one or more generations of back-crossing prior to the isolation of the haploids would presumably increase the chance of obtaining the desired type of diploid.

OIL PLANTS

525. Bhatia, G. S. and
Joglekar, R. G.
Some problems of oilseed breeding in the Madhya Pradesh.
Nagpur. Agric. Coll. Mag. 1949 & 1950 : **24** : Nos. 3 & 4 : 3–6.

Improvements of oilseeds achieved by breeding and selection in Madhya Pradesh and also future problems of breeding work are outlined; the crops dealt with comprise linseed, groundnut, sesame, niger (*Guizotia*), rape, mustard, castor bean and safflower.

526.
Ny oljeväxt. (**A new oil crop**).
Tidskr. Lantm. 1950 : **32** : p. 132.

The possibility of using *Xanthium* species as an oil crop has been investigated in Germany in recent years. Breeding has resulted in the production of two forms, one of which yielded 39% of oil, and the other 42%, with 47 and 36% of protein respectively.

527. Andersson, G. and
Olsson, G.
Orienterande försök rörande de vårsådda oljeväxternas köldresistens.
(**Initial trials regarding the cold resistance of spring sown oil crops**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 225–29.

Spring sowing of rape and turnip rape is desirable because with early sowing the yield of seed is higher and the risk of flea beetle attack, as well as frost damage, is less.
Seedlings of spring and winter rape, spring and winter turnip rape, Indian mustard, *Camelina*, poppy, linseed and *Crambe* were exposed for 8 hours to temperatures of from –6° to –8° C. in the freezing chamber to determine their frost resistance at the seedling stage and also the 3–4 leaf stage for the cruciferous species or when the linseed plants were 4–5 cm. long.
All the oil plants, except *Crambe*, which is the least hardy, can apparently stand night frosts of from –5° to –6° C. and *Camelina* even more severe cold. Indian mustard, white mustard, spring rape and spring turnip rape appear less susceptible to frost damage, at least at the 3-leaf stage, than linseed or poppy. At the seedling stage the last two equal the cruciferous group in hardiness.

528. Andersson, G.
Svalöfs Primex vitsenap. (**The Svalöf white mustard Primex**).
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 234–36.

The article reviewed in Abst. 139 is here reproduced.

529. Schwanitz, F.
Untersuchungen an polyploiden Pflanzen. VIII. Über das Wachstum von diploiden und autotetraploiden Keimpflanzen von gelbem Senf (*Sinapis alba* L.) und Sprengelrübsen (*Brassica rapa* L. var. *oleifera* Metzger). [**Investigations on polyploid plants. VIII. On the growth of diploids and autotetraploid seedlings of white mustard (*S. alba* L.) and turnip rape (*B. rapa* L. var. *oleifera* Metzger)**].
Züchter 1950 : **20** : 131–35.

Diploid turnip rape showed weaker growth and diploid mustard stronger growth than the corresponding tetraploids. These differences are referred to the difference in the alterations which may occur in the form of the cell as a result of polyploidization. For example, if in a long narrow cell the volume is doubled by polyploidization, but the form of the cell becomes shorter and thicker, then the relative surface, i.e. ratio of cell surface to cell volume, is decreased to a much greater degree than in the case of a short thick cell which, when the volume is doubled, becomes relatively longer and thinner. Such variations in the relative surface must be taken into account in considering the effects of polyploidy in various species, varieties and even lines and mutants.

530. Rudorf, W.
Über die Erzeugung und die Eigenschaften synthetischer Rapsformen. (**On the production and characteristics of synthetic forms of rape**).
Z. Pflanzenz. 1950 : **29** : 35–54.

Methods of producing new forms of *Brassica Napus* are described in detail. One method yielded amphitetraploid plants whilst all the other methods gave amphidiploids. Some of the best strains obtained from hybrid 104 x Lembke's rape showed yields 30% higher than that of Lembke's rape; 50 strains of the same amphidiploid and 9 strains of hybrid 104 x rape strain 259 showed 1000 grain weights about 20% higher than that of Lembke's rape. There was no significant improvement in winter hardiness of the new forms obtained, but the oil contents of some of the synthetic strains were somewhat higher than that of Lembke's rape. Further development of these experimentally produced strains which may result in new rape varieties surpassing Lembke's.
In the new strains, plants which proved to be haploids were found fairly frequently; the cause of their occurrence is unknown.
The origin of *B. Napus* in the course of evolution is discussed.

531. Bawkher, A. M.
Botanical nomenclature of the cultivated oil-bearing brassica species (mustard, rape and colza).
Co-op. Marketing Rev., Pakistan 1950 : **4** : 220–25.

The classifications of oil-bearing *Brassica* crops proposed by Prain, Kinzel and Alam are examined.

532. Leon, J. de.
A mamoneira—cultivo em Israel. (**The castor oil plant—its cultivation in Israel**).
Bol. Sec. Agric., Bahia 1949 : **46** : No. 5 : 59–67.

An account is given of the oil production of numbered strains and their hybrids in Israel. The author also discusses the performance of spineless varieties.

533. Meinders, H. C. and
Jones, M. D.
Pollen shedding and dispersal in the castor plant *Ricinus communis* L.
Agron. J. 1950 : **42** : 206–09.

Studies were carried out at Stillwater, Oklahoma, to determine the time of day of pollen shedding, the relative amounts of pollen dispersed in the air at various distances from their source, and the number of days during which the staminate florets shed pollen. The chances of maintaining genetical purity are much greater when the seed is produced under an isolation of 60 rods than in one of 25 rods or less. Less isolation might suffice in areas where the wind velocities are lower than in Oklahoma. A correlation coefficient of —0·18 was found between the number of staminate florets and the length of time required for the raceme to complete pollen shedding, indicating that lines with different numbers of flowers per spike could be developed to shed pollen over a long or short period.

534. Parthasarathy, N. and
Kedharnath, S.
The improvement of the sesame crop in India.
Indian J. Genet. Pl. Breed. 1949 : **9** : 59–71.

The origin and classification of sesame are discussed, data on genetics and attempts at interspecific and intergeneric hybridization are summarized, and an account is given of cytogenetical work at the Indian Agricultural Research Institute where *Sesamum prostratum* has been crossed with *S. orientale* with a view to developing strains of the latter resistant to phyllody disease and *Antigastra cantaunalis*. The use of autopolyploidy is also being investigated.

535. Kilby, W. W. and
Potter, G. F.
Tung culture in southern Mississippi.
Miss. Fm Res. 1949 : **12** : No. 6 : 3–7, 8.

Work at the Experimental Tung Field near Poplarville includes varietal testing and the growing of budded trees of promising selections. The characteristics are given of five new varieties released by the US Department of Agriculture (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2549).
A few selections are mentioned which have been found to produce fairly uniform seedling progenies, though this is exceptional. By discarding the seedlings which are not true to type, trees very uniform in type and fairly satisfactory as regards uniformity of production, oil content and season of maturity can be obtained. The important characteristics of promising seedling progenies, and yield data for 30 budded varieties and 2 seedlings are recorded.

536. Potter, G. F.
Observations on cold injury to tung trees in Louisiana and Texas, occurring in late March 1948.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 114–18.

Cold injury of varying degrees occurred during 1948 in one variety trial established at Calhoun, La., and another at Silsbee, Tex. Variation in cold injury within clones was noted which may have been due to slight differences in stage of development or degree of growth activity between the trees of a single clone. At both localities varietal differences in damage due to cold were significant at the ·01 level. The results indicate that the more cold resistant varieties can be planted without undue risk in northern Louisiana and eastern Texas.

537. Dickey, R. D.,
Drosdoff, M. and
Hamilton, J.
Copper deficiency of tung in Florida.
Bull. Fla Agric. Exp. Sta. 1948 : No. 447 : Pp. 32.

Differences among tung varieties and seedling progenies in susceptibility to copper deficiency of the soil are noted. No significant difference between the copper deficiency score of budded trees and trees from open-pollinated seed of the same variety has been found where both appear in the planting.

538. Neiger, Y.
(Growing summer cereals).
Hassadeh 1950 : **30** : 273–74.

In a discussion of oilseed crops suitable for cultivation in Israel, the sunflower varieties Yofitar and Polestar with high oil content and medium growth are suggested as being suitable for most parts of the country. The maize variety Californian has been cultivated in Lebanon and the northern parts of Israel for some time, but recent trials confirm that the variety Arali-Hageri is superior in yield.

539. Haussmann, G.
Rilievi sperimentali sulla coltura del girasole. **(Experimental findings on the cultivation of the sunflower).**
Annuario Ist. Speriment. Chim. Agrar. Torino 1946–1948 : **16** : 89–127.

With the ultimate object of promoting the cultivation of types of sunflower suitable for the different parts of Italy, a study was made of the sunflower strains grown in Piedmont with reference to their range and productivity and their possible value as material for selection. Earliness, seed production, oil content, and the presence or absence in the seed of the protective layer which prevents damage by the sunflower moth were among the characteristics investigated.
Medium early varieties are recommended for Piedmont, to ensure full ripening. The Russian selection Ždanov 8281 is mentioned for its earliness and abundance of ripe seeds, though its oil content was low. The botanical classification of sunflowers is also discussed.

540. Classen, C. E.
Natural and controlled crossing in safflower, *Carthamus tinctorius* L.
Agron. J. 1950 : **42** : 381–84.

Experiments have been carried out at the Nebraska Agricultural Experiment Station to determine the amount of natural crossing in safflower and to devise a satisfactory technique for controlled hybridization. Natural crossing in individual plants varied from 0 to 100%; the amount of outcrossing in most plants ranged from 5 to 40%. Some inbred lines selected for high yielding capacity and high average content of oil showed an average of less than 5% natural crossing. Cross pollination is mainly brought about in the safflower by insects. Of 298 crosses attempted by the hybridization technique described, 7% set one or more seeds; the average number of seeds set in successful crosses was 6·2 per head.

541.
Safflower, *Carthamus tinctorius*.
Seed World 1950 : **67** : No. 4 : p. 46.

A new variety of safflower N–852 with an average oil content of 32% has been developed at the University of Nebraska.

542. Cramer, P. J. S.
A comparison between oilpalms and coconuts.
Landbouwk. Tijdschr. Wageningen 1950 : **62** : 427–48.

The oil palm and coconut are compared for their economic value, and a review is given of oil palm selection and breeding, mainly with reference to work in the Belgian Congo.

TANNING PLANTS

543. Takenaka, Y.
(The relation between polyploidy and the size of stoma. I. On plants of the subgenus *Lapathum*).
Bot. Mag. Tokyo 1941 : **55** : 319–23 [from Jap. J. Bot. 1942 : **12** : Abst. 99].

A numerical relation was found between chromosome number and the length of the guard cells. For example, in *Rumex alpinus*, *R. conglomeratus* and *R. flexuosa* with $n = 10$ the average length of the guard cells is 5 to 7 units where 1 unit = 1/150 mm.; whereas in *R. maritimus* with $n = 20$ the guard cell length is 8·1 units, in *R. crispus* and *R. orientalis* with $n = 30$ it is 8·6 units and in *R. hydrolapathium* with $n = 100$ it is 9·2 units. *R. cordifolius* and *R. domesticus* do not conform to this regularity inasmuch as they have $n = 40$ and a guard cell length of only 7·8 units.

MEDICINAL PLANTS

544. Hirayoshi, I.
(Studies on artificial polyploids of forest trees).
Bot. and Zool. 1941 : **10** : 54–56 [from Jap. J. Bot. 1943 : **12** : Abst. 136].

While working on the induction of polyploidy in *Cinchona*, *Aphananthe* and *Paulownia* by colchicine treatment, the author concluded that the large size of the stomata was the most significant external sign of polyploidy. The stems of polyploids are usually shorter than those of the parents.

RUBBER PLANTS

545. Pessanha, M. V. T. and
Fragata Junior, A.A.
Estudos acerca da *Hevea Brasiliensis* na E.A.C. **(Studies on *H. brasiliensis* at the ECA*).**
Agron. Angol. 1950 : No. **3** : 59–71.

H. brasiliensis trees planted in Angola have been selected for future breeding.

546. de Buy Wenniger, W. F. M.
Variabiliteit der individuele producties van *Hevea* clonen. **(Variability of individual production of *Hevea* clones).**
Arch. Rubbercult. Ned. -Ind. 1950 : **27** : 153–76.

Occasional records of yields show wide variability, which is reduced if annual yield of tree is considered. There is, however, room for improvement of yield per acre by selective thinning. Comparison of yield of secondary clones budded from highest and lowest yielding trees of primary clones reveals no differences.

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* Estação Agrícola Central [Central Agricultural Station].

547. CARPENTER, J. B.
Plant pathology in the Division of Rubber Plant Investigations.
Plant Dis. Reporter 1950 : Suppl. 191 : 60–66.

A succinct survey is given of work carried out by the above Division of the US Department of Agriculture on resistance to *Dothidella Ulei* in *Hevea*, under the headings: methods and materials, resistance testing methods, classification of selection, regional tests on variability of the fungus, and results of the resistance studies. Recently leaf spot of rubber due to *Pellicularia filamentosa* has also received attention. So far no resistant selections have been found in *H. brasiliensis*. *H. rigidifolia*, a non-commerical species with leathery foliage, appears to be highly resistant or immune. Fortunately a few of the leaf blight top-working clones are fairly tolerant of leaf spot.

548. TYSDAL, H. M.
Apomictic interspecific hybrids are promising for rubber production from guayule.
Agron. J. 1950 : **42** : 351–55.

The possibilities of improving guayule by interspecific hybridization are being explored at Salinas, California. *Parthenium Stramonium* ($2n = 36$) is one of the most valuable species for crossing with *P. argentatum*. Apomictic forms of guayule with a chromosome number of $2n = 36$, 54 or 72 have been pollinated by the amphimictic species *P. Stramonium*, giving rise to apomictic hybrids with chromosome numbers of $2n = 54$, 72 and 90 respectively. *P. Stramonium* as female parent has also been crossed with sexual guayule ($2n = 36$) and apomictic guayule ($2n = 72$), sexually reproducing hybrids ($2n = 36$) and apomictic hybrids ($2n = 54$) being produced. Thus both sexual and apomictic hybrids can be readily obtained. Although the 72–chromosome plants of guayule are considered to be apomictic, all of them so far studied have produced 5 to 20% aberrants.
The results of tests on hybrids of the 90–chromosome group are reported. Such hybrids between *P. argentatum* and *P. Stramonium* have produced about twice the growth of guayule and about two-thirds the rubber content, and thus about 40% more rubber per plant than the guayule parent. These hybrids generally reproduce apomictically and therefore breed true. Many show about the same percentage of aberrants (5—20%) as the guayule parent but it is considered that the lower percentages would not be serious in commercial production. Cytogenetical study of hybrids between the two species is in progress.
In addition back-crossing has been carried out, using guayule plants ($2n = 36$) which normally reproduce sexually, to build up the rubber content in vigorous hybrids. These back cross plants are being used for further selection and for crossing on to highly selected, apomictic guayule plants with $2n = 54$ and 72.

549. KESKEVIČ, V.
Pokusné pestovanie kok-saghyzu na Slovensku. (**Experiments on cultivation of kok-saghyz in Slovakia**).
Sborn. Českosl. Akad. Zeměd. 1949 : **23** : 150–60.

Experiments on growing *Taraxacum Kok-saghyz* in Slovakia were begun in 1947. The initial plant material comprised a heterogeneous population from which three biotypes were individually selected.
The spring biotype was noted for its short growth period. It had a low rubber extraction of 4·35%, its roots weighed only 6·5 grm., and it lacked winter hardiness. The autumn biotype consisted of early and late spring forms. Its rubber extraction rate was 7·35%, and its roots weighed 23·30 grm. It was hardier than the spring biotype.
The winter biotype, which does not flower in the first growth season, is hardy and has a rubber content of 10·5% and roots weighing 45 grm.
The most satisfactory method for growing kok-saghyz in Slovakia was by planting vernalized seed by the cluster method in the spring.

550. GERSTEL, D. U. and MISHANEC, W.
On the inheritance of apomixis in *Parthenium argentatum.*
Bot. Gaz. 1950 : **112** : 96–106.

A fertile polyhaploid ($2n = 37$), which was facultatively apomictic and resulted from a polyploid form by parthenogenetic development of a reduced egg, was crossed with a sexually reproducing diploid ($2n = 36$). When the polyhaploid was used as the female parent the progeny comprised maternal plants produced apomictically, diploids, triploids, and plants with higher chromosome numbers; it was however suspected that the latter were the results of contamination. The progeny of the reciprocal cross consisted of only diploid F_1 plants. Diploids from both crosses were almost entirely sexual. Production of F_2 and back-cross generations was found to be difficult on account of incompatibility. The triploids from the cross in which the apomictic polyhaploid formed the female parent were facultative apomicts. In interspecific hybridization between some of these triploids and *P. Stramonium*, the triploids showed a highly apomictic behaviour. Tetraploids produced by colchicine treatment of diploids usually showed sexual reproduction. The conclusion is reached that the genes for apomixis in *P. argentatum* are recessive but that dominance is reversed in cases in which two genomes for apomixis become combined with one genome for sexual reproduction; and that, although apomixis is mainly determined by genotype, polyploidy may have modifying quantitative effects upon apomictic behaviour through its physiological influence upon rates of meiosis, egg cell division and pollen tube growth.

551. GERSTEL, D. U.
Self-incompatibility studies in guayule. II. Inheritance.
Genetics 1950 : **35** : 482–506.

Inheritance of self incompatibility in diploid guayule ($2n = 36$) can be studied with relative ease since crosses are either compatible or fully incompatible; the problem of pseudofertility does not arise. Incompatibility reactions were observed mainly by pollen tube tests; in addition seed setting tests were carried out on a limited scale. No incompatibility barrier was found other than that located in the stigmas. The progeny of a cross between two diploid selections and the reciprocal comprised four different classes of incompatibility; all crosses within these classes were incompatible as were also crosses between certain classes and between some classes and the parents. Tetraploid progeny plants, produced by colchicine treatment, gave the same four classes of incompatibility in selfing and crossing tests. The following hypothesis is proposed. Self incompatibility in the material studied is determined by a series of multiple alleles, designated R_1, R_2, R_3 and R_4, in contrast to the *S* alleles of the type of self incompatibility characterizing *Nicotiana*. This incompatibility in guayule is assumed to be under sporophytic control, i.e. all the pollen grains from one plant act alike as regards incompatibility reaction and their behaviour depends upon both alleles for incompatibility carried by the pollen parent. Dominance in the pollen of R_2 over the other alleles and of R_1 and R_3 over R_4 would explain the reciprocal differences observed in certain crosses. In general data from second generation plants, produced partly by back-crossing and partly from sib crosses, lent support to the above hypothesis. In another unrelated cross of two diploid parents, one parent showed incompatibility in all crosses with all of its progeny plants; the problem such a situation presents to the breeder is emphasized.
A survey of the compatibilities of 14 selections, of which only two were known to be closely related, suggested that many incompatibility classes exist in guayule since only a few cross incompatibilities occurred.
The inheritance of incompatibility relationships in *Nicotiana* and other genera is discussed. The type of self incompatibility found in guayule resembles that of *Nicotiana* in being controlled by a series of multiple alleles, that in *Capsella* by its sporophytic control, and the type of self incompatibility found in *Oenothera organensis* by dominance of certain alleles over others expressed in the pollen but not in the style. The type of self incompatibility shown by guayule has only been observed in one other plant, *Crepis foetida* subsp. *rhoeadifolia*, which like guayule is a member of the Compositae.

552. Johnson, B. L.
High rubber yielding selections from a natural population of guayule.
Agron. J. 1950 : **42** : 345–50.

The guayule accession 4265, a mass seed collection from five wild plants found in Durango, Mexico, was compared with 593, the most widely grown commerical variety in California. The characters studied comprised time of first bloom, plant height, spread of plant, and rubber and resin contents during the period 1944 to 1946. Accession 4265 was classified into three morphological types based upon differences in plant habit and leaf shape and colour; probably these types represented progenies of three of the plants included in the original collection. Two of the types, 4265–I and 4265–II, were markedly superior to variety 593 in plant size and content of rubber and resin. The data on variance, chromosome number, self fertility, and regression of rubber content on resin content indicated that each of the three types is largely apomictic; ways in which the difficulties raised in selection work by facultative apomixis may be overcome are briefly discussed.

553. Gerstel, D. U.
Is resistance to *Verticillium* wilt in guayule related to chromosome number?
Agron. J. 1950 : **42** : 310–11.

Highly significant differences between diploids, triploids and tetraploids in resistance to *Verticillium* wilt have been found, resistance increasing with chromosome number. Two possible explanations are put forward. Resistance may be an effect of polyploidy, or it may have developed independently of chromosome number in certain localities of Mexico and Texas where the strains were originally collected.

GUM PLANTS

554.
New Groehler guar under Texas trials.
Sth. Seedsman 1940 : **13** : No. 8 : p. 31.

Information is given on the origin of the new guar variety, Groehler, named after the farmer who selected the single plant from which the variety has been developed. The variety is under observation at the experiment stations in Texas.

RESIN PLANTS

555. Pervuhin, F. S.
(Natural hybridization of the spurge *Euphorbia biglandulosa*).
Priroda (Nature) 1949 : No. 2 : 59–61.

Finds were made of natural *E. biglandulosa* x *E. myrsinites* hybrids at five different locations in the southern Crimea, all between 200 and 300 m. above the sea level. Some of the hybrids bore greater resemblance morphologically to *E. myrsinites*, and some to *E. biglandulosa*, while other hybrids possessed intermediate characters or did not resemble either parent species.
Seed of some of these hybrids was planted with the object of studying the segregates under field conditions.

556. Pervuhin, F. S.
(The effect of ecological factors upon the resin production of spurge, *Euphorbia biglandulosa*).
Priroda (Nature) 1949 : No. 1 : 80–82.

A study, conducted in the Crimea, showed that the resin content in *E. biglandulosa* increased both when the plants grew at higher altitudes and under the conditions of lower average and absolute minimum temperatures. The resin content of the races of spurge growing under conditions of lower temperatures was greater than of the races growing under less severe climatic conditions. The hybrids between *E. biglandulosa* and *E. myrsinites* contained more resin than pure *E. biglandulosa* plants.

FRUITS AND NUTS

557. Brooks, R. M. and
Olmo, H. P.
Register of new fruit and nut varieties list No. 4.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 573–88.

A descriptive list is given of new varieties of apple, apricot, peach and other fruits and chestnut and tung.

558. Barnett, R. J.
Growing an orchard in Kansas.
Bull. Kans. Agric. Exp. Sta. 1950 : No. **337** : Pp. 48.

Recommended varieties of apples and other fruits are listed in approximate order of ripening. Tests of peaches and plums now in progress are referred to, and varietal characters of peaches are tabulated.

559. Lobanov, G. A.
(The effect of different quantities of pollen upon fertilization results).
Agrobiologija (Agrobiology) 1950 : No. **3** : 78–86.

The phenomenon of fertilization was studied in different fruits at Mičurinsk, with special reference to the effect of varied amounts of pollen upon fertilization results. The effects of supplementary fertilization were also considered.
The plant material comprised the apples Antonovka Obyknovennaja [Common Antonovka] treated with the mixed pollen of Beljfler Kitaïka [Bellefleur Chinese Crab] and Slavjanka [Slav], Grušovka Moskovskaja [Moscow Pear] x Papirovka, and Borovinka x Papirovka; the cherry Plodorodnaja Mičurina [Mičurin's Productive] x Ljubskaja; the black currant Lija Plodorodnaja [Productive Lija] selfed and pollinated with the pollen of the gooseberry Angliïskiï Želtyï [Yellow English]; and the gooseberry Purman [Poorman] treated with the mixed pollen of Finik [Date] + Zelenyï Butyločnyï [Green Bottle] + Industrija [Industry] + Careless.
Pollination with a large amount of pollen was found to result in better development of the fruits from intravarietal, intervarietal and distant crosses. The positive effect of larger amounts of pollen was observed not only in respect of seed production, but was also noticeable on the pericarps, particularly of the plants with many seeded fruits. The offspring from the crosses for which ample amounts of pollen were used was more uniform and possessed greater vitality than the offspring from other crosses. The F_1 from crosses made with insufficient amounts of pollen segregated a range of forms varying in vigour. Some of these were dwarfed and depressed, others healthy and normal. The use of

inadequate amounts of pollen in hybridization work with fruits must be avoided because it causes undesirable changes in the heritable properties of the hybrids. Supplementary fertilization is superfluous provided large amounts of pollen are used for pollinations and weather conditions are favourable to fertilization.

560. Švan-Guriĭskiĭ, I. P.
(The Chinese jujube).
Priroda (Nature) 1949 : No. 3 : 68–70.

Introduction to Russia of selected Chinese varieties of *Ziziphus sativa*, of which a dozen grown in different parts of China are listed, is urged.

561.
The Minnesota Experiment Station. . . .
Seed World 1950 : **67** : No. 4 : p. 46.

The following new fruit varieties which are hardy when grown on the northern edge of the cornbelt have been released by the Minnesota Experiment Station: the Orient cherry, the Golden Spice pear, the Oriole apple and the plum varieties Redglow and South Dakota (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2795).

562. Mileško, A. F.
(Mičurin varieties of apples and pears in the Crimea).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 12–15.

The results of trials with Mičurin varieties of apples and pears at the Crimean Zonal Fruit Research Station are reported. Of the apple varieties tried Beljfler Kitaĭka [Bellefleur Chinese Crab], Pepin Šafrannyĭ [Saffron Pippin], Kandilj Kitaĭka [Candille Chinese Crab] and Šafran Kitaĭka [Saffron Chinese Crab] were recommended for state varietal tests. The pear variety Bere Zimnjaja Mičurina [Mičurin's Winter Beurré] gave a good account of itself in trials with over 100 other varieties. Early bearing was an important asset, but it was also hardy, vigorous and productive and bore large good quality fruits. Reference is made to use of the variety in hybridization work.

563. Pleseckiĭ, P. F. and
Zelenskiĭ, M. A.
(Breeding dwarfing rootstocks for pears and apples).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 18–20.

New hardy dwarfing stocks for apple were obtained from crosses between *Malus Zumi* and cultivated apple varieties at the Ukrainian Scientific Research Institute of Horticulture. The stocks for pears were selected from seedling quinces combining the dwarfing habit with hardiness.
Both apple and pear rootstocks were trained to develop the layering habit. Selected quince stocks 334 and 332 were remarkable in this respect. They produced 63 to 86% upright, healthy rooted layers in the second year after being planted in the nursery stool beds.

564. Petrahilev, I. M.
(A collective farm horticultural centre).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 20–23.

Mičurinite breeding work with fruit trees and small bush fruits in the Minusinsk district, Siberia, is reported. Several hardy Reinette apple varieties, selected at the Minusinsk

Experimental Field Station, are listed and new varieties of pome and stone fruits selected at a collective farm by the Mičurinite P. S. Ermolaev are described.

Pome fruits

Ranetka Ermolaeva [Ermolaev's Reinette], from Ranetka Purpurnaja [Purple Reinette] x Belyĭ Naliv [White Juice], is hardy and bears bluish red fruits having thin glossy skin and pale pink flesh. The fruits weigh 15 grm., are of flattened round shape and have good flavour. The trees bear in their fifth year and have a satisfactory cropping capacity.
Avrik, from the same cross is also a hardy and productive variety. It has attractive reddish pink fruits with transparent skin, upon which drops containing fructose appear at maturity. The fruits are round, slightly ribbed and weigh 18 to 20 grm. Their flesh is firm and juicy with a flavour resembling grapes. The fruits keep for two months.
Hybrid 3, from Ranetka Purpurnaja x Aport Aleksandriĭskiĭ [Alexandria Aport], is hardy and productive. The tree is tall and shows resistance to scab. The fruits are round and attractive and have firm, juicy pale pink flesh. They weigh 15 grm. and are cherry red. The variety reaches maturity in September and the fruit keeps until spring. The fruit flavour improves during storage.
Hybrid 4, from Sibirka [Siberian] x Pepin Šafrannyĭ [Saffron Pippin] is hardy and grows upon its own roots. It has small yellow fruits weighing 5 grm. The same name was given to a hybrid obtained from the same cross but trained upon a Beljfler Kitaĭka [Bellefleur Chinese Crab] mentor.

Stone fruits

This hybrid has larger fruits weighing 15 grm. Seedling 1 is a hardy cherry plum hybrid selected from plants grown from stones, planted in 1939. Its first bearing was in 1946, since when it has been cropping regularly. The fruits have good flavour and are dark red, flat, wedge shaped, and weigh 16 grm. Their flesh is pale yellow, juicy, tender, moderately firm and has free stones. The cropping capacity of seedling 1 is not affected by windfalls and the fruit keeps well in transport.
Seedling 4 was selected from plums grown from stones in 1941. The first bearing was in 1947. The tree is hardy and resistant to fungous diseases. The fruits are nearly round and weigh 15 grm., with reddish yellow skin, and firm yellow flesh having good flavour. The variety is not susceptible to windfall and the fruit keeps well in transport.

565. Overcash, J. P. and
Ragland, C. H.
85 apple varieties grown in experiment station orchards.
Miss. Fm Res. 1949 : **12** : No. 11 : 1, 2.

A breeding programme was initiated several years ago, and seedlings of known parentage are now beginning to produce fruit at State College. Observations are recorded on varieties and seedlings which are being studied.

566. Jakovlev, P. N.
(On the creative inheritance of I. V. Mičurin).
Agrobiologija (Agrobiology) 1950 : No. 3 : 38–44.

The trial, at Mičurinsk, of the plant material which was left behind by Mičurin at his death (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2023) has been continued. The most recent selections of hybrids now in bearing include 23 promising apples, three of which were derived from seed offspring of Ranet Bergamotnyĭ [Bergamotte Reinette] x Beljfler Želtyĭ [Yellow Bellefleur]. The notes on the artificial production of *Malus sylvestris* contained in the above mentioned paper have been expanded to include the present author's theories on the origin of several *Malus* spp.
Some practical information on breeding pome fruits in Russia is included.

The apple varieties Beljfler Želtyĭ, Candille Sinap and Parmen Zolotoĭ [Golden Pearmain] are among the recommended southern varieties for crosses with the hardier apples, because of a high proportion of cultivated forms segregated in their offspring. Six hardy central Russian and seven Mičurin varieties especially suitable for hybridization with the southern varieties are listed. Crosses between any of the following Mičurin varieties give hardy apples which are not inferior to back-crossed hybrids of Mičurin varieties x European varieties: Beljfler-Kitaĭka, Kandilj-Kitaĭka, Bessemjanka Mičurina [Mičurin's Seedless], Pepin Šafrannyĭ [Saffron Pippin], Šafran-Kitaĭka [Saffron Chinese Crab], Slavjanka [Slav] and Pepin-Kitaĭka [Pippin Chinese Crab].
The study of Mičurin's pear hybrids showed that some southern pears having small and unattractive fruits give useful economic varieties after hybridization with the hardy Ussuri pear, *Pyrus ussuriensis*; Žosefina Miheljskaja [Josephine Michel], Lesnaja Krasavica [Forest Beauty], Ljubimica Klappa [Clapp's Favourite] and Dekanka Osennjaja [Autumn Dekanka] are included in this group of southern pears. It is pointed out that none of the 700 fruiting Ussuri pear hybrids in Mičurin's nursery resembled their wild female parent. This is ascribed to the shattering effect of new environment upon the inheritance of the Ussuri pear.

567. Schneider, G. W.
Characteristics of progeny from certain apple crosses.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 205–12.

The results obtained with the progenies of various crosses at the New Jersey Agricultural Experiment Station are discussed in relation to fruit size, colour, dessert quality and time of ripening. The following crosses were the best for combinations of suitable fruit colour, quality and size: Golden Delicious x Edgewood, Red Rome x Jonathan, Yellow Newtown x Red Rome, Red Rome x Petrel, Yellow Newtown x Edgewood, Red Rome x Twenty Ounce and Golden Delicious x Red Rome.

568. Einset, J.
The Wrixparent, a "tetraploid" apple.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : p. 262.

The Wrixparent apple was found to have the same chromosomal constitution as its large fruited sports. It is a simple diploid-tetraploid chimera. In all parts of the tree only the single layered epidermis has the diploid chromosome number of 34, all the internal cells having 68 chromosomes. It seems likely that the variety is a sport of Yellow Transparent.

569. Einset, J. and
Imhofe, B.
Chromosome numbers of apple varieties and sports. II.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 197–201.

Further study of the chromosome numbers of apple varieties and sports, carried out at the New York State Agricultural Experiment Station, is reported (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 477). A table is given in which the numerous apples investigated are grouped as diploids, triploids or diploid-tetraploid chimeras. The latter, which are described in the text, comprise sports of Grimes, McIntosh, Ontario, Wealthy and Yellow Transparent. They represent three distinct types differing in the relative amounts of diploid and tetraploid tissue.

570. KEMMER, E.
Zur Frage der Blattmodifikationen beim Apfel. (**On the problem of leaf modification in the apple.**
Züchter 1950 : **20** : 153–56.

Experimentally produced leaf modifications in the apple are discussed. So far, there is no irrefutable proof that in the apple the "primary stage" can be fixed as a "youth form." The correct use of the term "youth form" is defined.

571. CARLONE, R.
L'autosterilità e l'intersterilità nel melo. (**Self sterility and intersterility in the apple**).
Genetica Agraria, Roma 1948 : **2** : 9–49.

Records are presented of the results of experiments during 1944–47 on the degree of sterility of apple varieties grown in Italy. The work also included investigations on parthenocarpy, flowering time, germination capacity of the pollen and an extensive series of intervarietal crosses showing the compatible and incompatible combinations and their possible genetical basis, as indicated by an arbitrarily adopted scheme of sterility factors.

572. SAX, K.
The use of *Malus* species for apple rootstocks.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 219–20.

In breeding work at the Arnold Arboretum, Harvard University, it has been found that some Asiatic species of *Malus* are apomictic and breed true from seed even when pollinated by other species. These apomictic species have been tested as rootstocks for commercial apple varieties. The most promising results have so far been obtained by budding McIntosh on *M. sikkimensis*. If suitable types can be found among the apomictic species, the reproduction of "clonal" rootstocks by seed offers certain advantages over propagation by layering or cuttings.

573. HILKENBÄUMER, F.
Das Verhalten von Apfelstammbildnern in der Baumschule. (**The behaviour of apple stem builders in the nursery**).
Kühn-Arch. 1949 : **62** : 65–215.

Fifty-two varieties of apple were tested as stem builders. Croncels, Jacob Fischer, Dominesti and Hibernal were the only varieties showing sufficient frost hardiness and vigour of shooting for growing as tall stems, combined with sufficient compatibility with the crown graft and resistance to scab, mildew and stem canker.

574. DÍAZ, J. R.
Desarrollo del tubo polínico en pistilos de manzanos, en flores autopolinizades y en polinizaciones cruzadas recíprocas de las variedades Delicious y King David. (**Development of the pollen tube in apple pistils in self-pollinated and reciprocal cross-pollinated flowers of the varieties Delicious and King David**).
Rev. Fac. Agron. B. Aires 1950 : **12** : 318–39.

The rate of pollen tube growth, especially during the first 24 hours after pollination, was much greater after cross pollination than after selfing.

575. MARTIN, D. and
CARNE, W. M.
Brown heart and related disorders. Investigations in Tasmania 1934-42.
Rep. Div. Pl. Ind. Australia 1950 : No. 11 : Pp. 44. (Mimeographed).

The effect of variety and other factors on the susceptibility of apples to brown heart, alcoholic breakdown and other types of breakdown during storage is indicated.

576. GERAŠČENKO, E. D.
(**The best apple varieties in the Akmolinsk province**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : p. 78.

As a result of trials with over 100 apple varieties conducted at the Šortandino Agricultural Research Station 24 varieties were found to be adapted to cultivation under the severe northern Kazah conditions. Brief notes are given on the most productive of these varieties, including six large fruited varieties.

577. BRIERLEY, W. G.,
ALDERMAN, W. H. and
WEIR, T. S.
Winter injury to apple trees in Minnesota 1947-48.
Proc. Amer. Soc. Hort. Sci. 1950 : 55 : 259–61.

Winter injuries to several varieties of apple are compared. The results are regarded, not as a measure of ultimate cold resistance, but as the combined effects of heavy crop, drought, depleted food reserves, immaturity and loss by March 11 of cold resistance developed earlier.

578. PETRAHILEV, I. M.
(**Mičurin varieties of fruit trees in the Krasnojarsk Territory**).
Agrobiologija (Agrobiology) 1950 : No. 3 : 52–53.

In Siberia, Mičurin varieties of apples are used in breeding for larger size and better quality of the fruit. The varieties are used both as the male and female parents in crosses and as mentors for hybrid plants. The varieties Pepin Šafrannyĭ [Saffron Pippin], Šafran Kitaĭka [Saffron Chinese Crab], Ranet Bergamotnyĭ [Bergamotte Reinette], Kaljvil Anisovyĭ [Anis Calville] and Slavjanka [Slav] are of better quality when grown in Siberia than in the Moscow and Tambov provinces. The desirable properties of the Mičurin varieties include early bearing, resistance to scab and good keeping quality. Some varieties can be trained to acquire a prostrate Minusinsk growth habit which guarantees their better survival in winter. Of the 19 standards for the Krasnojarsk Territory, which are listed, 11 apples are Mičurin varieties. Suitable proportions for planting of these varieties in the orchards are suggested, the summer, autumn and winter varieties being grouped separately.

579. LEONOV, I. M.
(**A valued Reinette variety**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : p. 77.

In trials at Novosibirsk of 28 Reinette varieties, Skalenovka Rozovaja [Pink Skalenovka] proved as hardy as Ranetka Purpurnaja [Purple Reinette] and hardier than all other Reinette varieties.
Skalenovka Rozovaja is resistant to scab, productive, early and an annual bearer. It is not susceptible to windfall. The fruits are 20 x 25 mm., flat, rounded, ribbed, uniformly pink and have 4 cm. long fruit stalks. They reach maturity in September and have good flavour.

580. Johansson, E.
Försök med äpplegrundstammar. (**Trials with apple root stocks**).
Försök och Forskning 1950 : **7** : 36–37.

Sort- och grundstamförsök med äpple. II. Vid Alnarp. (**Variety and root stock trials with apples. II. At Alnarp**).
Medd. Stat. Trädgårdsförs. 1950 : No. 59 : Pp. 10.

This report records the performance of Cox's Orange, Yellow Richard and Laxton's Superb on the East Malling Stocks IX, IV and XIII and the Swedish stock A2. Ten years after planting, all three varieties on A2 were larger and had a higher total yield than those grafted on XIII. A2 is very suitable as a stock for weak varieties, e.g. Cox's Orange and James Grieve, and should probably largely replace other vigorous clone and seedling stocks under Swedish conditions.

581. Bradford, F. C.
Inheritance of susceptibility to cedar-apple rust in seedlings of crab apples.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 213–15.

The incidence of *Gymnosporangium Juniperi-virginianae* in seedlings of native crab apples and seedlings resulting from crosses of European cider apples with Eurasian and native crabs was studied at Glenn Dale, Md.

582. Carlone, R.
La pera Madernassa. (**The Madernassa pear**).
Ital. Agric. 1950 : **87** : 419–29.

This pear, which arose as a chance seedling over a century ago in the Alba district of Italy, is known for its hardiness, vigour and high cropping capacity and has lately taken the place of Martin Sec, which is excessively susceptible to parasitic diseases, in many localities of the Piedmont. From a study of the morphological features of the variety, which are here described, it is thought probable that Martin Sec was one of its parents, but its fruits are much superior to the parent in flavour and size. It displays high resistance to *Venturia pirina* and to insects such as *Anthonomus pomorum.*

583. Thagušev, N. A.
(**The principal Čerkessian pear varieties**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 28–30.

Two land varieties found in the Krasnodar Territory, which are expected to interest pear breeders, are described. Hatema is resistant to wind, cold and drought. The individual tree described is grafted on a common pear stock and is about 100 years old. It is 25 m. tall and has a crown diameter of 16 m. The harvest time lasts from mid-August to mid-September. The fruit does not keep but it can be used for drying. A single fruit weighs between 60 and 100 grm., and the cropping capacity of a tree is between 500 to 1000 kg., but the first bearing is in the twelfth or fifteenth year and the variety is a biennial bearer. The skin is tough, smooth, firm and of medium thickness. Its colour is green to dark green and yellow according to the state of maturity. When harvested all pears have white, firm and juicy flesh, but for table use the pears are kept long enough to become soft and brown. The pears are sweet and have an aroma characteristic of the Čerkessian pears.
Deïlekuž, sometimes called Handžalakuž, is also a long-lived, late and biennially bearing variety. The specimen studied was 9 m. tall and had a crown of 8 m. in diameter. The

tree was grafted on a common pear rootstock and was 45 to 50 years old. The fruit is ripe for picking from mid-September to October, and keeps 10 to 15 days after it has been picked. All fruits examined were free from injury due to pests or fungous diseases. The fruits weigh between 105 and 135 grm. Their colour is green to dark olive green. The skin is tough, firm and of medium thickness. The flesh is greenish white, sweet and coarse, but its flavour improves when it is allowed to become brown. The pears make a good dry product. The annual cropping capacity of the tree is between 300 and 600 kg.

584. Balašov, P. K.
(Kamyšino apricots).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 20–21.

Reference is made to new forms of Japanese quinces, *Crataegus*, apricots, currants and *Amelanchier* selected at the Kamyšino Forest Amelioration Centre in 1948. The apricots 3 and 4 were used at the institute for grafting seedlings of the Manchurian and common apricots.

585. Guzzini, D.
Le "prugne vere." **(The true prunes).**
Ital. Agric. 1950 : **87** : 341–56.

The original French prune, the Prunier d'Ente or Prunier d'Agen, which was said to be a hybrid introduced into France at the time of the crusades, has given rise to a number of distinct types differing in fruit size, selection among which has led to improved types such as Robe de Sergent, Double Robe and the Impériale group. These formed the original basis of the Californian prune industry.
In Italy there are two main types, the Casalinga [Domestic] or German prune, of unknown but ancient origin, and the Italia, which originated in the vicinity of Milan a century ago. Several clones of each exist. The Italian prune Zucchella shows more resemblance to the French Agen than to the other Italian types; other prunes of the French group have been imported from America. A certain amount of work has been done towards selecting the best types and a plea is made for the intensification of this activity.

586. Markov, N. V.
(New Alma Ata varieties of plum).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 16–20.

Seven new varieties of plum have been selected and their reproduction secured at the Scientific Research Institute of Agriculture, Kazah Branch of the USSR Academy of Sciences. The varieties, with the exception of Originaljnaja which is stunted, are of medium vigour. They all come into bearing in their fourth or fifth year, are moderate in their requirements, reach maturity in August and bear a good to moderate crop suitable for making prunes.
Originaljnaja [Original], from Burbank x Černyĭ Abrikos [Black Apricot], had the colour of its fruit flesh improved by the use of Černyĭ Abrikos as a mentor. The variety was propagated vegetatively on myrobalan rootstocks. The trees are stunted and hardy. The fruits, weighing 35 grm., are dark red and rounded. The flesh is dark red, juicy, sweet and of good flavour. The stone clings as in Černyĭ Abrikos.
Žemčužina [Pearl] is a natural hybrid of Renklod Prozračnyĭ [Transparent Gage]. The leaves are large and tough. The fruit, which is dark brown and oval shaped, weighs 45 to 50 grm. The flesh is tender, juicy and sweet and has good flavour. The stone is small and free.
Malenjkaja Krasavica [Little Beauty] was selected from the hybrids of open-pollinated Renklod Zelenyĭ [Green Gage]. The fruits are small, round, greenish yellow with attractive

mauvish pink cheeks. The flesh is sweet and has the good flavour of Renklod Zelenyĭ. The stone is free and small.
Kazahstanskaja [Kazahstan] was selected from open-pollinated Vengerka Ažanskaja [Ažansk Hungarian]. Its fruit quality was improved by training on soil with fertilizer dressings. The fruit weighs 35 grm., is of uneven, oval shape and dark brown in colour, with many large subepidermal dots. The flesh is juicy, sweet and of good flavour. The stone clings.
Renklod Tamary [Tamara's Gage] is a selected seedling from a naturally cross-pollinated Renklod Zelenyĭ. The fruit weighs 45 grm. and is round and golden yellow with attractive pink cheeks. The flesh is firm, sweet and juicy and of good flavour. The stone is small and free.
Rodina [Motherland] is a selected seedling from open-pollinated Vengerka Ažanskaja. The fruits are oval, dark brown, unevenly variegated, and with a waxy bluish bloom. The flesh is sweet and juicy and has a good flavour. The stone is free.
Ala Tau is a selected seedling from open-pollinated Ekaterininskaja. Its yielding capacity was improved by the previous use of Viktorija [Victoria] mentors.
The variety is productive, much of the crop being borne by one year old shoots. The fruits weigh 35 to 40 grm. They are of irregular oval shape and unevenly dark brown colour, with many subepidermal dots. The flesh is amber coloured, sweet, juicy and has a good flavour. The stone is free.

587. Markov, N. V.
(The effect of mentors in breeding new plum varieties).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 15–17.

Several instances of the application of Mičurin's mentor method to plum breeding at the Kazah Branch of the Lenin Academy of Agricultural Sciences, sometimes leading to disappointing results, are reported. The use of mentors gave the new varieties Originaljnaja [Original] and Ala Tau (cf. Abst. 586). Viktorija [Victoria] was also used as a mentor for the improvement of an open-pollinated hybrid of Renklod Prozračnyĭ [Transparent Gage], which however was not sufficiently worthwhile and was discarded. Renklod Prozračnyĭ as a mentor failed to improve the fruit flavour in the hybrid 18/3 from Renklod Prozračnyĭ x sloe, while the large fruited red fleshed myrobalan Kzyl Sultan [Red Sultan] mentor depressed a young vegetatively reproduced Markov plum tree without having the desired effect upon its fruit colour.

588. Panasjuk, M.
(The best varieties of plums grown for their dry product).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 73–74.

Analyses were made of 16 plum standards and 12 other varieties at the Mleev Horticultural Scientific Research Station. The varieties Vengerka Obyknovennaja [Common Hungarian], Vengerka Glinskaja Rannjaja [Early Glinskaja Hungarian], Vengerka Glinskaja, Anti-imperial [Anti-imperialist], Kirk, Renklod Aljtana [Altana Green Gage], Vengerka Ažanskaja [Ažansk Hungarian], Anna Spät, Černosliv Glinskiĭ [Glinskiĭ Prune] and Vengerka Italjjanskaja [Italian Hungarian] yielded the best quality dry products, and are recommended for cultivation in the Ukrainian woody steppe.

589. Bogoljubova, O. P.
(Myrobalan in the Leningrad province).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : p. 77.

Myrobalan forms, characterized respectively by earliness, large fruits and oval shaped fruits, have been selected from the hardy myrobalans growing in the Leningrad province.

590. Brierley, W. G. and
McCartney, J. S.
A study of the cold resistance of European plums.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 254–58.

Tests of plum varieties for cold resistance, carried out in Minnesota, are reported, reaction to controlled low temperatures being compared with reaction in the orchard. The data show that varieties of the *Prunus insititia* type are somewhat hardier than those of the *P. domestica* type, the hardiest of which are Mount Royal, Russian Green Gage and Stanley.

591. Swerts, E.
Een nieuwe vroege kers. (**A new early cherry**).
Fruitteelt 1950 : **40** : p. 570.

A new cherry as thick fleshed as Early Rivers and as early as Vroegste der Markt [First at Market] has been produced by crossing (Early Rivers x Poolse) x Vroegste der Markt. It is a strong grower, healthy and very prolific. The fruit does not split readily and is deep red, but the stalks are too short for hand picking and the flavour leaves something to be desired.

592. Wellington, R. and
Lamb, R. C.
Sweet cherry breeding.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 263–64.

An account is given of crosses between cherry varieties at the New York Experiment Station, beginning in 1911. From crosses made during the period 1937 to 1940, 27 selections, the type and parentage of which are indicated, have been obtained.

593. Clarke, W. S. (Jun.).
Selected mazzard cherry seedlings leaf spot free.
Suppl. No. 3 Bull. No. 515 : 62nd Rep. Pa Agric. Exp. Sta. 1950 : 6, 8.

Some seedlings from wild mazzards have shown hardiness and freedom from attacks of leaf spot (*Coccomyces hiemalis*) throughout their growth of 25 years at the Pennsylvania Agricultural Experiment Station; it is expected that these seedlings will provide valuable material for cherry rootstocks.

594. Breviglieri, N.
La rassegna delle frutta estive a Verona. (**The review of summer fruits at Verona**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1949 : **33** : 118–23.

A brief account is given of the national fruit show at Verona, where samples of summer fruits from all parts of Italy were on view. The peach hybrids of Professor Morettini attracted particular attention, especially hybrids 9/14 to 11/14 and 1/14.

595. Higdon, R. J.
The effects of insufficient chilling on peach varieties in South Carolina in the winter of 1948-49.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 236–38.

The deleterious effects on different peach varieties of the lack of sufficiently long exposure to temperatures of 45° F. or less are described.

596. Oberle, G. D. and
Bennett, H. O.
Germination trials on open pollinated peach pits from the 1945 crop of named varieties and seedling selections.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 221–25.

The peach breeding programme at the New York State Agricultural Experiment Station provided the opportunity of collecting data on the formation of sound kernels, proportion of kernels germinating and production of vigorous seedlings from peach pits collected from 45 open-pollinated varieties and selections.

597. French, B. O. and
Vincent, A. E.
A planting policy for the canning peach industry in the Murrumbidgee Irrigation area. The varietal aspects. Part 4. Conclusions and recommendations.
Agric. Gaz. N.S.W. 1950 : **61** : 291–302.

The discussion of the suitability of peach varieties for canning is concluded (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2582). The main objective of the study has been the choice of suitable varieties for advancing the peach harvesting season in the Murrumbidgee irrigation area; for this purpose Young's Cling, Vincent and Gaume are recommended.

598. Verrhoff, O. and
Clayton, C. N.
Foliage retention of peach varieties in the North Carolina sandhills.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 37–39.

Defoliation before the end of summer and incidence of bacterial spot have been found to be highly correlated; this correlation suggests that differences in susceptibility to bacterial spot may be the chief cause of the differences observed between varieties in respect to premature defoliation. There appeared to be some relationship between the parentage of the varieties and susceptibility to bacterial spot.

599. Overcash, J. P. and
Ragland, C. H.
New peach varieties show promise in station tests.
Miss. Fm Res. 1949 : **12** : No. 10 : p. 8.

The peach variety orchard at State College contains about 108 varieties of bearing age and 52 varieties consisting of young trees which have not yet come into bearing. New varieties are added each year. The characteristics taken into account in evaluating the varieties and tests now being carried out in cooperation with branch experiment stations are discussed. Some of the newer varieties which are showing promise are Redhaven, Dixired, Fireglow, Sunhigh, Erly-Red-Fre, Fisher, Newday, Triogen and Raritan Rose.

600. Kapcinelj, M. A.
(Growth of the citrus industry).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 42–48.

Soviet plant breeders have made world collections of wild cultivated citrus plants and obtained many new forms by hybridization. Mičurinite methods were used in breeding hardy citrus fruits for new districts. Mention is made of new promising varieties which are under trial before being finally released. Two hardy oranges bred by Zorin at Soči, hybrid 2004 and Sočinskiĭ [Soči] 2006, and the orange variety Pervenec [First Born] developed by

Ryndin and Esinovskaja at the USSR Breeding Station for the Humid Subtropics are referred to.
The variety 2004 was obtained from Unshiu mandarin x orange. It has good quality fruits and is productive and hardier than the existing orange varieties and the mandarin. Sočinskiĭ 2006 is as hardy as the mandarin.

601. Moreira, S.,
Costa, A. S. and
Grant, T. J.
Conhecimentos atuais sôbre a tristeza dos citrus. (**Present knowledge on the tristeza disease of citrus fruits**).
Bol. Sec. Agric., Bahia 1949 : **46** : No. 5 : 34–42.

See *Plant Breeding Abstracts*, Vol. XX, Abst. 1875.

602.
(The Section for Biological Sciences. The problem of hardiness of citrus plants).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1949 : No. 8 : 72–73.

The Soviet method for breeding hardy lemons and oranges is to cross them with the hardy *Poncirus trifoliata* and hardy tangerines. Research is directed at finding biological methods of inducing earlier bearing in the hybrids, which at present require seven to twelve years to reach the fruiting stage.

603.
New fruits acclimatized in Hungary.
Agric. News Hungary 1950 : No. 7 : p. 3. (Mimeographed).

A brief account is given of work on the acclimatization of citrus fruits in Hungary, in progress at the Agricultural Research Institute, Esterháza, under the direction of M. Faragó. It is expected that it will be possible to grow lemons in Hungary. Lemon trees introduced from Italy are being crossed with various types of frost resistant forms; satisfactory results have been obtained by crossing *Citrus trifoliata* and ordinary citrus trees; acclimatization of tangerine and orange in the same manner is planned. It is also stated that a new fruit called the raspberry-strawberry has resulted from experiments by Porpáczi; the fruit is the size of a small lemon and grows on bushes six feet high.

604. Lacarelle, M. A.
Notes sur le clémentinier dans la vallée de l'Ouerrha. (**Notes on the clementine in the Ouerrha valley**).
Progr. Agric. Vitic. 1950 : **67** :104–12.

In discussing the plantations of clementines in the Ouerrha valley in Morocco, the biology of reproduction of these hybrid fruits is mentioned, with observations on parthenocarpy, pollen germination and chromosome number ($n = 9$).

605. Cizik [Tsizik], B.
(A suggestion for the introduction of important plants into the Negev).
Hassadeh 1950 : **30** : 325–37.

The author suggests that the varieties of Siamese pomelo Kao Pan and Kao Phuang, which have been found to thrive best on soils with a salt content of 0·8 to 2·11%, should be introduced into the western vale of Israel and into the Negev.

606. NAKAMURA, M.
(The chromosome number of the genus *Fortunella*, with special reference to diploidy of the "Golden Bean" *F. Hindsii* Swingle).
Studia Citrol. 1941 : **10** : 12–17 [from Jap. J. Bot. 1942 : **12** : Abst. 61].

F. Hindsii, F. japonica, F. Margareta, F. crassifolia and *F. obovata* were all found to have $n = 9$ chromosomes, indicating a close phylogenetic relation of *Fortunella* with *Citrus* and *Poncirus* which have the same number. The discovery of diploid *F. Hindsii* indicates that the tetraploid *F. Hindsii* is an autotetraploid. The evolution of *Fortunella* species is thought to have been through gene mutation or recombination of alleles, and not through polyploidy.

607. CONDIT, I. J.
Fig characters as affected by climate.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 114–18.

Varietal differences in response to climatic conditions are noted.

608. MAURI, N.
Les figuiers cultivés en Algérie. **(The fig trees cultivated in Algeria).**
Bull. Doc. Renseign. Agric. Serv. Arb. Algér. (undated) : No. 150 : Pp. 56.

In addition to information on the history, botanical characteristics and systematic classification of fig trees, with special reference to Algeria, this booklet contains detailed descriptions of many Algerian varieties, with notes on their economic value, and also two tables for identifying varieties by their fruits at the green or riper stage of growth.
There is also an alphabetical list of varieties found in various localities with their synonyms (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 430).

609. SADAPHAL, M. N.
Some important nutritive constituents of two varieties of mango imported in Nagpur market.
Nagpur Agric. Coll. Mag. 1949 & 1950 : **24** : Nos 3 & 4 : 29–31.

The juice of two varieties from southern India, Baiganphali and Neelam, was analysed for moisture, acidity, sugars, proteins and mineral constituents. Neelam had a higher content of sugars, Baiganphali higher calcium and phosphate contents in the ash of the juice and higher acidity and fibre content.

610. DAYTON, W. A.
Clarence Arthur Reed.
J. Wash. Acad. Sci. 1950 : **40** : 207–08.

An appreciation is given of the late C. A. Reed who was responsible for investigations on nuts in the Bureau of Plant Industry of the US Department of Agriculture. Two of his filbert novelties, numbers 1667 and 2336, are now under test.

611. KARTHAUS, L.
Notenteelt. **(Cultivation of nuts).**
Fruitteelt 1950 : **40** : 418–19.

As a result of 30 years' selection, three new walnuts are recommended: two mutually fertile, suitable for commercial exploitation and one self fertile suitable for growth as a solitary tree but otherwise too big. All compare favourably with other sorts in colour, quality and yield.

612. Dorofeev, P. P.
(The biology of flowering and fruiting of the walnut in Moldavia).
Priroda (Nature) 1949 : No. 4 : 48–50.

The problem of dichogamy in walnuts is discussed, with special reference to the effect of external conditions upon flowering of both the protogynous and protandrous forms. The Moldavian forms of *Juglans ovata* and *J. obovata* proved either protogynous or protandrous, while *J. globosa*, *J. elongata* and *J. compressa* were normally protogynous. Dichogamy is more marked in younger trees, the difference between the flowering of the male and female flowers sometimes being as great as 10–12 days. This difference is reduced, as the trees grow older, to 3 to 5 days.

613. Ozol, A. M.
(A method for increasing hardiness of young walnut trees).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 26–28.

Acclimatization studies with walnuts conducted at the Laboratory of Evolutionary Ecology of the Forest Institute of the USSR Academy of Sciences, Moscow, showed that plant material from the Ukraine, Armenia and Dagestan was remarkable for its hardiness. Pruning one year old shoots in summer made the young trees less susceptible to cold injury.

614. Serr, E. F. and
Day, L. H.
Lesion nematode injury to California fruit and nut trees, and comparative tolerance of various species of Juglandaceae.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 134–40.

Lesion nematode (*Pratylenchus pratensis*) is causing serious damage to fruit and nut trees in several districts in California. Preliminary tests of species and hybrids of Juglandaceae, made in the hope of finding resistant rootstocks, have indicated that Paradox walnut hybrids (*Juglans Hindsii* x *J. regia*) and *Pterocarya* sp. are either highly resistant to or highly tolerant of the lesion nematode.

615. Rovskiĭ, B. M.
(The pecan in central Asia).
Priroda (Nature) 1949 : No. 6 : 61–62.

Successful acclimatization of the pecan, *Carya olivaeformis*, in Turkmenia, Uzbekistan and Tadžikistan is reported. Introductions of American varieties have been recently added to the original plant material, which came from the Black Sea Littoral. The pecans introduced from the USA included some hardy varieties such as Major and Indiana. The trials indicate that the pecans are sufficiently hardy and drought resistant under the conditions of irrigated cultivation in central Asia. The problem of cultivating the pecan in alpine districts is being considered.

616.
News of the world.
Unasylva 1950 : **4** : 86–93.

Reference is made to three new chestnut varieties, Nanking, Meiling and Kuling, developed at Beltsville, Maryland (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1135). They are resistant to chestnut blight and are the culmination of nearly 40 years' research.

617. DARPOUX, H.
Le chancre du châtaignier causé par l'*Endothia parasitica*. (**Chestnut blight caused by *E. parasitica***).
Inst. Nat. Rech. Agron. Paris 1949 : Doc. Phytosan. No. 7 : Sér. Path. Pp. 28.

The possibility of breeding resistant varieties in France is mentioned as the most hopeful method of control.
In addition, it might be possible to discover resistant types of *Castanea vesca*; and *C. mollissima*, which is highly resistant, grows rapidly and gives nuts of quite good quality, could be grown in some parts of France.
Successful hybridization work in USA and Italy is cited (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 524).

618. GRIGGS, W. H.
Effect of low temperature on blossom survival and fruit set of nineteen varieties of almonds.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 125–28.

Data are given on the effect of low temperature on blossom survival and fruit set of 19 almond varieties during 1948 in California. The resistance of the blossoms to low temperatures depended largely upon their stage of maturity but the importance of inherent cold resistance was also indicated by significant differences in survival and fruit set among varieties with essentially the same dates of blooming.

619. SAUGER, L.
A propos d'une nouvelle méthode de sélection de l'arachide. (**Apropos of a new method of selection of the groundnut**).
Oléagineux Rev. Gén. Corps Gras Dérivés 1950 : **5** : 574–78.

Larroque's method of selection (cf. *Plant Breeding Abstracts*, Vol. X, p. 252, Vol. XIX, Absts 3 and 1994, and Vol. XX, Abst. 528) in which the breeder works with hereditary complexes instead of separate characters, is here critically examined, and with special reference to the groundnut. The writer finds the method acceptable for allogamous plants, but for autogamous plants he regards the classical technique of selection from individuals as the right one, unless some proof of the value of the new method should be offered.
P. Larroque's comments on the article are prefixed.

620. SCHWARZ, M. B. and
HARTLEY, C.
De selectie van Schwarz 21, een tegen slijmziekte resistente lijn van *Arachis hypogea*. (**The selection of Schwarz 21, a strain of *A. hypogaea* resistant to *Bacterium solanacearum***).
Landbouw 1950 : **22** : 223–44.

The two manuscripts that have been combined and edited twice in this paper were received for publication in 1927. The variety was distributed and has proved to be a valuable substitute for the local varieties previously grown. Varieties cultivated in Indonesia fall into three groups. The creeping Tjina varieties were not planted much after 1922. At the same time varieties of the Brol group were largely replaced by those of the Holle group, but maintained themselves locally, e.g. in the Vorstenlanden. The Holle group includes widely differing varieties, whereas those of the Tjina and Brol groups do not differ much. In all probability only self pollination is effective, so that any variety is in fact a collection of pure lines. Full descriptions are given of the susceptibility of these lines to *B. solanacearum* and

methods employed in testing them. Varieties of the Tjina group appear to be highly resistant but otherwise worthless, varieties of the Brol group appear to be susceptible, while resistance in the Holle type was much more variable. Varieties from America were much more susceptible than Schwarz 21.

621. CHILD, R.
Recent research on the coconut palm with special reference to Ceylon.
Emp. J. Exp. Agric. 1950 : **18** : 177–89.

A survey of cytological and breeding work is included. Because the male parents of hybrids are unknown and the female parents heterozygous there is no guarantee that the performance of a high yielding palm will be reproduced in its progeny. Progeny tests should therefore be made, followed by crosses between proved parents.

622. LIYANAGE, D. V.
Preliminary studies on the floral biology of the coconut palm.
Trop. Agriculturist 1949 : **105** : 171–75.

The tall type of coconut palm is protandrous and generally cross-pollinated. In the dwarf and King palms, male and female phases overlap and usually self pollination occurs. A medium of 10% cane sugar plus 2% gelatine is favourable for pollen grain germination. Viability of the pollen grains can be prolonged by storage in a desiccator with 43·4 % H_2SO_4.

623. GUKASJJAN, A. S.
(The fig and pomegranate in southern Kazahstan).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 46–49.

As a result of trials conducted at the Bostandyk Experimental Field of 22 Crimean and introduced foreign varieties of fig, the following productive varieties are recommended for cultivation in southern Kazahstan: Uzbekskiĭ Želtyĭ [Yellow Uzbek], Čapla, Boržezot, Dalmatskiĭ [Dalmatian], Smirnskiĭ [Smyrna] and Adriatičeskiĭ [Adriatic].
Similar trials with 12 varieties of pomegranates originating from Central Asia and Azerbaĭdžan led to the selection of seven varieties adapted to cultivation in southern Kazahstan. The varieties are Kazake-Anar, Kzyl-Anar, Ačik-Dana, Ak-Dana, Bostandykskiĭ [Bostandyk] 6 and 13 and Kelesskiĭ 5.
Breeding of new hardy and productive varieties of both these fruits with the use of Mičurinite methods is urged.

624. RADŽABLI, A. D. and
BELIKOV, S. A.
(The promising olive varieties of Azerbaĭdžan).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 9 : 30–33.

Bakinskiĭ [Baku] 25 and 17 are regarded as the hardiest and most adapted olive varieties grown in Azerbaĭdžan, but the former is late in maturing and the latter has the undesirable habit of periodic bearing. Natural cross pollination of these varieties and Mičurinite training of the offspring have given hybrids remarkable for their hardiness, earliness and good quality fruits. Brief descriptions are given of a dozen of the selected hybrids, whose reproduction is intended under the following varietal names: Nizami [Regular], Hazar-bary [Peace], Elmaly [Apple-like], Karagilja, Agvan-bary, Širvan-bary, Vatan-bary [Motherland], Kjur-bary, Slava Apšerona [Glory of Apšeron], Felix, Basar and Hally.

625. Abdullaev, A. G.
(Trials of subtropical fruits in Azerbaĭdžan).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 40–44.

The results of experiments conducted in Azerbaĭdžan to find the most suitable districts for the cultivation of fig, persimmon, almond, pomegranate and tung are reported. Only in the case of the almond and pomegranate was more than one variety tried. The pomegranate variety Gjuleĭša had larger and better quality fruit on all experimental plots than the central Asiatic variety Namanganskiĭ [Namangan] and Kyrmyzy Kabuh [Red Skin].

626. Choudhari, B. L.
A study on the sex determination and change of sex in papaya (*Carica Papaya*).
Nagpur Agric. Coll. Mag. 1949 & 1950 : **24** : Nos. 3 & 4 : 15–19.

None of the commonly held beliefs among papaya growers regarding the determination of sex before flowering has been verified, e.g. that seeds formed at the upper end of the fruit are generally staminate or that bold seeds produce male plants. It is suggested that pollination of a female type by a hermaphrodite type is the best method of obtaining plants which all yield fruit.

627. Hodgson, R. W.
The avocado—a gift from the middle Americas.
Econ. Bot. 1950 : **4** : 253–93.

A general account of avocado production in the United States is presented, including sections on the origin and spread of the fruit, classification, ecological races, flower behaviour and pollination, bearing behaviour and varieties.

628. Wolfe, H. S.,
Toy, L. R.,
Stahl, A. L. and
Ruehle, G. D.
Avocado production in Florida.
Bull. Fla Agric. Ext. Serv. 1949 : No. 141 : Pp. 124.

Notes are included on the three races of *Persea americana*, on varieties cultivated commercially in Florida, and on pollination.

629. Oberle, G. D.,
Moore, R. C. and
Nicholson, J. O.
Parents useful in breeding autumn-fruiting red raspberries for Virginia.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 269–72.

The red raspberry variety Sunrise possesses a gene or genes for the character of autumn fruiting derived from Ranere, which are different from the gene or genes for this character carried by Indian Summer and originating from Lloyd George. Sunrise is well adapted to conditions in Virginia and its seedlings are early ripening in the autumn season; the variety should therefore prove valuable in breeding autumn fruiting red raspberries for this state.

630. Spirina, V. V.
(Gooseberries in the eastern zone of the Vologda province).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 22–24.

Breeding work with gooseberry in the Vologda province is reported. The initial plant material consisted of unidentified varieties from Leningrad, Moscow and Gorjkiĭ. The plants were grown from seed closely together to encourage cross pollination. The varieties selected at the first stage included Zelenyĭ Plodorodnyĭ [Green Productive] and Ohroželtyĭ [Ochre Yellow]. Later selections made at the Nikoljskiĭ branch station gave about 40 additional varieties showing promise in breeding and for the industry. Six of them are described.
Podobnyĭ Šanonu [Shannon Like] resembles Belyĭ Plodorodnyĭ [White Productive], which is a synonym for Shannon. It is productive, hardy and resistant to *Sphaerotheca* and has a moderately tall semispreading growth habit. The fruits grow singly and weigh 5 to 10 grm. They are hairy, round oval, sometimes oval, irregular and asymmetrical. Their colour is pale green with a yellowish tinge. The skin is thick. The flavour is good.
Šejanec Flamingo [Flamingo Seedling] was thus designated because of the pink colour of its fruits. It has the same habit as Podobnyĭ Šanonu and is productive, hardy and immune from *Sphaerotheca*. The fruits grow singly and weigh 5 to 6 grm. They have more round than oval shape, and are dull crimson with a little bloom. Some fruits have a few hairs. The skin is thick. The flavour is good.
Seedling 108 has a low semispreading habit. It is moderately productive and lacks hardiness, but it is immune from *Sphaerotheca*. The fruits grow singly and weigh 7 to 8 grm. They are oval or elliptical, hairless, whitish green and with a bloom. The skin is thick, and flavour good. Seedling 176 has poor cropping capacity, but it is hardy and immune from *Sphaerotheca*. It produces a moderate sized semispreading bush. The fruits grow in pairs and each weighs between 6 and 7 grm. Their shape is oval, their colour red with a waxy bloom, their surface smooth and the skin thick. The flavour is satisfactory.
Seedling 105 has a vigorous and spreading habit. The fruits grow in pairs and less frequently singly. They are round and a little thinner at the stalk and sometimes round oval. Their average weight is 3 grm., their colour light greenish, with a waxy bloom, and their surface, but for occasional single hairs, smooth. The skin is thin. The flavour is not entirely satisfactory. The variety is immune from *Sphaerotheca* and moderate in its external requirements. It is hardier and more productive than Haughton.
Pušistyĭ [Fluffy] has pubescence on fruits and leaves. The bush is spreading and moderately tall. The round oval or oval fruits are small and grow in pairs, with occasional single fruits weighing 2·8 grm. They are dusky pink. The skin is thick. The flavour is good. The variety is hardy, productive and immune from *Sphaerotheca*.

631. Wenzl, H.
Eine neue rotfrüchtige mehltauresistente Stachelbeersorte. **(A new red mildew resistant gooseberry variety).**
Pflanzensch. Ber., Wien 1950 : 5 : 106–09.

This new red gooseberry variety Mehltaufeste Höfleiner [Mildew Resistant Höflein] found at Höflein in Austria is highly resistant to American mildew. The fruits, 6–9 cm. long, grow singly on the bush, which has many thorns. The origin of the seedling is unknown.

632. Simonova, M. N.
(Using the method of I. V. Mičurin).
Agrobiologija (Agrobiology) 1950 : No. 3 : 45–51.

Breeding work, which included distant hybridization and Mičurinite training methods, at the Moscow Fruit Research Station is reported, as a result of which several new varieties of gooseberry and strawberry were produced. Some of these are described.

Gooseberry

Hybridization between the American varieties, resistant to powdery mildew, and the large fruited Russian varieties Finik [Date], Limonnyĭ Ispolinskiĭ [Giant Lemon], Varšavskiĭ [Warsaw], Zelenyĭ Butyločnyĭ [Green Bottle] and Industrija [Industry[, with back-crossing afterwards of the hybrids either to the American or the Russian varieties was the principal method employed. Mention is made of large fruited hybrids showing some resistance to powdery mildew which were derived from crosses with Haughton. A black fruited variety for jam making was obtained from Černyĭ Negus [Black Negus] x Finik.

The varieties Pjatiletka [Five Year Plan], Mysovskiĭ [Bay] 17 and Mysovskiĭ 37, which were derived from Haughton x Limonnyĭ Ispolinskiĭ, were made standards for the Moscow province. The varieties are non-susceptible to powdery mildew.

The following varieties are still under trial.

Rekord [Record], from Haughton x Finik, has a vigorous semi-spreading habit. Its fruits are round to oval, glabrous, large and rust-red, with a waxy bloom and a rusty greenish flesh of good flavour. The fruits weigh up to 8 grm. The variety is late.

Smena [Change], from Haughton x Zelenyĭ Butyločnyĭ, has the same growth habit and shape of fruit as Rekord, but its fruits are smaller and red and have a more striking waxy bloom. Their flesh is red and has good flavour. The variety is medium late.

Jahont [Gem], from Haughton x Avenarius, has a medium sized bush with a semi-spreading habit. Its fruits are oval, red and smooth with a waxy bloom and weigh 4 to 5 grm. They have an attractive flavour. The variety is late.

Izumrud [Emerald], from Zelenyĭ Butyločnyĭ x Haughton, has a medium tall, moderately spreading bush; it bears fruits weighing 4 to 5 grm., which are round or oval and dull green, and have a waxy bloom. The flesh is green and has a good flavour.

Geroĭ [Hero], from Haughton x Finik, has a vigorous semispreading growth habit. It has round smooth cherry red fruits with a waxy bloom, which are medium large and have a good flavour. The variety is medium late.

Krasnaja Zarja [Red Dawn], from Haughton x Varšavskiĭ, has a medium tall bush and spreading habit. Its fruits are round to oval, smooth and bright red with a bloom. The skin is thin and transparent. The flavour of the fruit is good. The variety is medium late.

All the above varieties are productive, show resistance to *Sphaerotheca*, and can be propagated vegetatively with relative ease.

Strawberry

The varieties Komsomolka [Komsomol], Mysovka [Bay], Aĕlita [Élite A] and Obiljnaja [Abundant] were bred at the station from Čudo Ketena [Caton's Wonder] x Roščinskaja. Further hybridization between these varieties and the élite seedlings 16–145 and 16–96, or these varieties and Luiza [Louise] and Pozdnjaja Leopoljdsgaljskaja [Late Leopold Hall] gave several new productive and hardy strawberries which are superior to the previously cultivated western European varieties.

Krasavica Zagorjja [Ultramontane Beauty] arose as a result of natural cross pollination of Komsomolka with Mysovka. It is early and is remarkable for its fruit quality. The berries are large and weigh 35 grm. They grow upon a neck into a round-oval or conical oval shape. The berries are red to dark red, and very glossy. The flesh is tender and red, and has a good flavour. The variety reaches maturity in the Moscow province at the same time as Roščinskaja, Mysovka and Obiljnaja.

Pozdnjaja iz Zagorjja [Late Ultramontane] was bred from Pozdnjaja Leopoljdsgaljskaja x Hybrid 16–96, which was itself derived from Čudo Ketena x Roščinskaja. The variety has the desired characters of late maturity, large fruit and good fruit quality. It is staminate and can be grown, unlike its female parent, without a pollinating variety.

Negritenok [Piccaninny], was developed from 16–145 x Luiza. The hybrid parent used in the cross was itself derived from Čudo Ketena x Roščinskaja. The variety is productive and bears fruits of good quality. Its inflorescences grow upright and the fruits cannot normally touch the ground. The berries are medium to small, dark red and of round conical shape. The flesh is firm and red and has a good flavour. The variety is medium early. It is hardy under Moscow conditions.

Pionerka [Pioneer] was bred from Aëlita x Mysovka. It is hardy, productive and resistant to strawberry mite. The berries are medium large and disuniform regarding their shape during the first picking. Later harvested berries are round-conical or oblong-conical. Their colour is dull red. The variety is early to medium early.
Podarok Vesny [Spring Gift] originated from Aëlita x Mysovka. It is early, hardy, productive and has good quality fruits. The berries are conical, light red in colour and glossy. The flesh is soft, sweet and pale.
Narjadnaja [Smart] was bred from Hybrid 16–145 x Luiza. It has large fruits of attractive appearance and good flavour. They weigh up to 20 grm. and have oval to round-conical shape, without ribs. The flesh is tender, pink-orange, and has a good flavour. The variety is hardy and a good cropper.
Rozovaja [Pink] was bred from Pozdnjaja Leopoljdsgaljskaja x Belaja Ananasnaja [White Pineapple]. It is productive and remarkable for the good flavour of its fruits.

633. Brightwell, W. T.,
Darrow, G. M. and
Woodard, O. J.
Inheritance in seedlings of *Vaccinium Constablaei* x *Vaccinium Ashei* variety Pecan.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 239–40.

Crosses were made between the hexaploid species *V. Constablaei* and *V. Ashei*, variety Pecan with a view to developing a blueberry suitable for the southern States, which ripens earlier and has smaller seed and more tender flesh than the majority of the varieties of the latter species. The most desirable qualities of the F_1 hybrid seedlings are their early maturity and small dry scar; the most undesirable characters are small size of berry, dark colour, and lack of vigour in most plants. Some seedlings with the desired characters were however obtained. Further crosses and back crosses have been effected in which use has been made of the varieties Walker and Myers of *V. Ashei* and selections of the above and other hybrids between *V. Ashei* and *V. Constablaei*. By the use of superior varieties of both species it should be possible to secure much more promising seedlings.

634. Morrow, E. B.,
Darrow, G. M. and
Rigney, J. A.
A rating system for the evaluation of horticultural material.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 276–80.

A rating system based upon a scale of 1 to 10 and upon visual and other sensory perception has been devised for evaluating large numbers of progenies; its application to blueberries and strawberries is described.

635. Anstey, T. H. and
Wilcox, A. N.
The breeding value of selected inbred clones of strawberries with respect to their vitamin C content.
Sci. Agric. 1950 : **30** : 367–74.

An account is given of a study of vitamin C content in certain populations from crosses made in 1946 at the University of Minnesota between the varieties Marshall 3, Dunlap 3, Minnehaha 2, Chaska 1 and Premier 1. It is concluded that high vitamin C content is partially dominant over low vitamin C content. Marshall 3 appeared to transmit high vitamin C content particularly well, especially in combination with Minnehaha 2, Dunlap 3

and Premier 1, while Minnehaha 2 transmitted high vitamin C content well in all crosses except with Premier 1. There was a significant negative correlation between weight per fruit and vitamin C content and a significant positive correlation between plant vigour and weight per fruit. Parents, when selfed, produced some plants with a higher vitamin C content than their own, and the cross populations also contained some plants with a higher vitamin C content than the parents and, in some cases, than in the populations from the selfed parents, indicating recombination of favourable genes. Large fruited individuals rich in vitamin C may occur frequently enough to allow for the selection of other desirable characters within this group of individuals. All crosses with the inbreds used in this study give progeny with satisfactory vigour.
Variability within selfed lines is discussed.

636. Zaljadnova, A. P.
(Strawberry varieties for the arid zone in the south east).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 13–16.

Trials of 59 varieties of strawberries at the Saratov Fruit Research Station are reported. The seven varieties particularly adapted to cultivation in the arid Saratov province and combining good fruit quality with high yield and other economic characters included Elšanka, Ljubovj Povolžjja [Love of Volga Country] and Iosif Magomet [Joseph Mahomet]. These three varieties were remarkably hardy, their resistance to cold being almost as great as that of *Fragaria collina*.

637.
Rot-free strawberry.
Amer. Nurserym. 1950 : **92** : No. 5 : p. 48.

A new variety, Vermilion, resistant to red core, is being distributed in Illinois. It was developed by S. S. Colby at Urbana. In addition to red core resistance the variety possesses resistance to leaf spot, leaf blight and leaf scorch. It produces high quality fruit, suitable for transporting and is recommended for commercial and home gardens, especially on heavy soils. The fruits are medium to large, round to round-conical in shape, smooth, glossy, medium red and evenly coloured. They are well formed throughout the harvesting period of about two weeks. Yields are satisfactory.

638. Demaree, J. B.
***Fragaria vesca* as an index plant for some virus diseases of strawberry.**
Phytopathology 1950 : **40** : p. 870. (Abst.).

Tests at Beltsville, Maryland, showed that *F. vesca* is a much more suitable indicator plant for strawberry yellows than the American variety Marshall, previously used. Preliminary trials indicate that there may be a complexity of strawberry viruses in the United States.

639. Judkins, W. P.
The effect of training systems and irrigation on the yield of everbearing strawberries grown with sawdust mulch.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 277–84.

Varietal yields and fruit size under different planting systems in Ohio are indicated. The response of different varieties to irrigation is also mentioned.

640. NYHLÉN, A.
Försök med jordgubbar vid Nyckelby under åren 1944–1948. (Trials with strawberries at Nyckelby during the years 1944-48).
Försök och Forskning 1950 : **7** : 38–40; also Medd. Stat. Trädgårdsförs. 1950 : No. 57 : Pp. 18.

A combined irrigation and variety trial at Nyckelby during 1945–48 included: Inga, Abundance, Sieger, Southland, Königin Louise, Gruss aus Dahlem, Southland x Inga 10, Southland x Luna 235 and XVI–52, the last three having been raised at Alnarp. Southland x Luna 235 has now been multiplied and is on the market.
The highest yields were obtained from Southland x Luna 235 and Southland, with XVI–52 a close third, and Inga, Abundance and Deutsch Evern next. The last named, the earliest variety, was closely followed by Southland. The latest crop was obtained from XVI–52.
The new varieties Southland x Luna 235 and XVI–52 are highly recommended for the region covered by the trial.

641. WILCOX, R. B. and
DELAP, J. M.
Tests of cranberry hybrids in 1945 for probable resistance to the false blossom disease.
Proc. Annu. Convent. Amer. Cranberry Gr. Ass. 1946 : **77** : 12–13, 16. [from Biol. Absts. 1947 : **21** : Sect. D : Abst. 18132].

Details are given of comparisons of 362 new hybrid seedlings, 40 hybrid selections of 1941 and some named varieties not tested before, as compared with Howes, Early Black and Shaw's Success. The hybrids tested were derived from 13 parent varieties. The average rating of the hybrids tested in 1945 was 13·7; about 1% of them were more susceptible than Early Black which with MacFarlin was rated 13. The average rating of the tested selections was 12·6 as compared with an average of 13·7 for the hybrids.

642. CUNHA, J. F. DA.
Cultura da bananeira. (**Banana culture**).
Ministério da Agricultura, Rio de Janeiro 1948 : Pp. 107.

Descriptions are included of the more important Brazilian varieties.

643. GOVINDASWAMI, S.
Doubling of chromosomes in the root tips of *Musa*.
Curr. Sci. 1950 : **19** : p. 255.

Doubling of the chromosomes has been observed in root tip cells of the wild species *M. sanguinea* and the cultivated variety Safet-velchi (*M. paradisiaca*), both normally diploid ($2n = 22$). Cytological observations suggested that the doubling resulted from the arrest of anaphase caused by failure of the spindle mechanism.

644. POGOSJAN, S. A.
(The development of seedlings and hybrids of direct producer vines).
Agrobiologija (Agrobiology) 1950 : No. 3 : 87–103.

The suitability of seedlings and hybrids of direct producer vines as plant breeding material was explored at the Institute of Wine Making and Viticulture of the Armenian Academy of Sciences. The experiments with the seedlings of eight varieties which have come into

bearing, showed that they are as sensitive in response to directed training as hybrid plants. Promising seedlings have been selected. Two of them were derived from Karmir Kahani, two from Spitak Arakseni and three from Voskeat.
The hybrids displayed extensive variation in the F_1. Heritable changes in the shape, size and colour of their fruits, their seed characters and other properties occurred when young plants were trained upon stocks of the local varieties acting as mentors.
The promising new vines include the hybrids Icaptuk x Erevani Rozovyĭ [Pink Erevan] 78, trained on Erevani Rozovyĭ and on Ararati [Ararat] stocks. These are being multiplied up for the production of late table grapes in the plains of Armenia. The hybrid trained on Erevani Rozovyĭ has flowers of the bisexual type, while the hybrid grafted on Ararati has flowers of the female type.
Several local varieties of Armenian vines were crossed with Rišter 31 [Richter 31] and then grafted on the stocks of cultivated local vines. These hybrids were inferior to the hybrids between the cultivated local varieties in respect of all economic characters except hardiness, because of the conservative inheritance of their wild parent. Their improvement by training on cultivated stocks was but slight. The American and Amur vines are less suitable than the hardy wild local vines and Mičurin varieties as plant material in breeding for hardiness under the conditions of the Ararat valley.

645. Kirillov, I. F.
(Viticulture in Tadžikistan during 20 years).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 35–38.

Mention is made of wild Tadžik vines having small black juicy grapes and varieties Agur Kalon, Tagobi and Maizi [Blue] obtained from unknown Tadžik breeders. The breeding tasks of the Scientific Research Institute for Fruits, Vines and Vegetables include the development of productive, large fruited, seedless, early and good quality varieties which are sufficiently hardy for cultivation without covering up with soil during the winter.

646. Martynova, R. V.
(Heroes of socialist labour in viticulture).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 28–32.

Reference is made to the new table varieties of grapes, Pobeda [Victory] and Muskat Uzbekistanskiĭ [Uzbekistan Muscat], selected by A. M. Negrulj and S. M. Žuravelj in Uzbekistan.

647. Breider, H.
Zur Züchtung neuer Qualitätssorten bei der Weinrebe. **(On the breeding of new high grade varieties of vintage grapes).**
Züchter 1950 : **20** : 135–53.

An earlier ripening vine variety is required which will give reliable yields and surpass the present standard vine varieties in quality and yield. The inheritance of character complexes was studied. The total sugar content and total degree of acidity are conditioned by additive, or cumulative, polymeric genes. The genes for total sugar content and total degree of acidity are inherited independently.

648. Cebriĭ, M. P.
(On the intergeneric hybridization of vines).
Vinodelie Vinogradarstvo SSSR (Wine making Viticult. USSR) 1950 : No. 7 : 16–17.

Several intergeneric hybrids of vines were obtained at the Ukrainian Scientific Research Institute of Viticulture and Wine Making, by the use of Mičurinite methods. These included (1) adding to the pollen of the pollinating variety, one part in four of the pollen of

the female parent, (2) dusting the female flowers with particles of the stigma of the male variety, (3) using male pollen to which the fragrance of the pollen of the female variety was imparted, and (4) using mixed pollen of two varieties, one of which was more compatible with the female parent in the cross.
The highest proportion of successful crosses between *Ampelopsis* and *Vitis* was obtained when the female flower was fertilized at the final phase of maturity. According to A. Ja. Kuzjmin the ovaries at this stage are more receptive to the gametes of distantly related plants because the possibilities for cross pollination with closely related plants have been exhausted and the survival of the kind depends upon fertilization. The following hybrids were obtained:—
(*a*) [Sereksia Černyĭ (Black Sereksia) x (*Ampelopsis* + Mourvèdre)] x Rupestris 1202. The mixed pollen used in the preliminary cross consisted of three quarters *Ampelopsis* and one quarter Mourvèdre pollen.
(*b*) Sereksia Černyĭ x (*Ampelopsis* + Sereksia Černyĭ). The latter variety supplied one part of pollen to three parts of *Ampelopsis* pollen.
(*c*) Sereksia Černyĭ x *Ampelopsis*, *Ampelopsis* x Aligoté and *Ampelopsis* x Matjaš Janoš. All these hybrids were produced by hybridizing at the final phase of maturity. The second of these crosses was also facilitated by dusting the female flowers with particles of the stigma of the pollinating variety.
(*d*) Kopčak x (*Ampelopsis* + Kopčak), three quarters of the pollen being supplied by *Ampelopsis* and one quarter by the female parent. Crosses between Kopčak and *Ampelopsis* were also obtained by pollinating the flowers of Kopčak when they reached the final phase of maturity, by imparting the Kopčak fragrance to the pollen of *Ampelopsis* and by dusting Kopčak flowers with the stigma particles of the pollinating variety.
(*e*) [Kopčak x (*Ampelopsis* + *Riparia*)] x Rupestris 101–14, the pollen in the preliminary cross comprising three quarters *Ampelopsis* and one quarter *Riparia* pollen.

649.

(Viticulture in new districts).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 8 : 16–24.

Šebeko, A. F. *In the Saratov province. I.*

Most of the vineyards in the province are planted with European vines, the Mičurin and Far Eastern varieties occupying only 6% of the cultivated area.
Dates of maturity and sugar content and acidity of the grapes for thirteen varieties grown under Saratov conditions are given. The dry wines from the grapes of Seryĭ [Grey] Pinot, Vengerskiĭ [Hungarian] Muscat, Belyĭ [White] Muscat and Plečistik [Broad Shoulder] scored particularly well in degustation tests. Both Muscat varieties can be used for making good quality champagnes.

Syčev, P. P. *In the Saratov province. II.*

The most important European varieties grown in the province are Belyĭ [White] Chasselas, Madeleine Angevine, Portugieser, Hungarian Muscat, Černyi [Black] Pinot, Seryĭ Pinot, Rozovyĭ [Pink] Traminer and Aligoté.
The Mičurin varieties Russkiĭ Konkord [Russian Concord], Černyĭ Sladkiĭ [Sweet Black] and Severnyĭ Belyĭ [Northern White] bear grapes with a high sugar content and low acidity. The grapes of the Far Eastern varieties Aljfa and Minnesota Seedling have a sugar content of over 20% when grown under the local conditions.

V., I. *In the Čuvaš ASSR.*

Dressings with phosphorous and potash fertilizers hastened the maturity of the grapes and vine shoots and increased the sugar content in the varieties Aljfa and Tihonova [Tihonov's] 9. The effect of other agricultural methods was studied upon ten Mičurin and Far Eastern varieties of vines, grown under Čuvaš conditions.

Isaev, M. S. *In the Tambov province.*

Brief notes are given on nine varieties of vines grown by the present writer in the province, including descriptions of Solodihinskiĭ Zolotistyĭ [Golden Solodihinskiĭ], Daljnevostočnyĭ [Far Eastern], Amerikanskiĭ Černyĭ [American Black], Amerikanskiĭ Rozovyĭ [American Pink] and Fioletovyĭ [Mauve].

Solodihinskiĭ Zolotistyĭ
This is a local variety, probably derived from Malingre. It is bisexual and has compact bunches of oval shaped grapes, covered with a firm elastic skin. The grapes mature in August.

Daljnevostočnyĭ
The variety was obtained from a cross made at Mičurinsk between the Amur vine and a European variety. It bears small black grapes growing in small dense bunches with pink juice. Vigorous growth and early maturation of the wood are characteristic of the variety. It is hardier than the European vines.

Amerikanskiĭ Černyĭ
This is a hybrid between American varieties, probably from *Vitis riparia* x *V. Labrusca.* The variety is popular in the Tambov province on account of its great hardiness. It makes a good rootstock for other varieties.

Amerikanskiĭ Rozovyĭ
This is a *V. Labrusca* variety, resembling Russkiĭ Konkord, but having a bisexual flower. The variety is vigorous and its wood matures early. It is hardy and makes a good stock for grafted vines.

Fioletovyĭ
This bisexual European variety is not yet clearly defined. It has serrate five-lobed leaves with hairs on the lower side like Madeleine Angevine but has mauve veins. The variety bears fused conical bunches. The grapes are round, dark blue and between 16 and 18 mm. in diameter. The juice is colourless and its flavour combines suitable acidity with sweetness. Of all varieties of vines which have been described by Lazorevskiĭ, Fioletovyĭ only resembles Asyl Kara.

650.
(M. P. Cebriĭ).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) **1950** : No. 8 : p. 61.

An obituary notice to M. P. Cebriĭ, the late director of the USSR Scientific Research Institute of Viticulture and Wine Making, is published. It contains references to his contribution to vine breeding in Russia. He developed a method of grafting non-woody plant material upon vines used as mentors, and of hastening fruiting in hybrid vines, and methods of breeding vines for hardiness and resistance to mildew and *Phylloxera.* Cebriĭ showed that the characters of the local varieties are dominant over those of other vines in interspecific crosses.

651. Peyer, E.
Der Blauburgunder in der Ostschweiz und seine Selektion. (**The Blauburgunder vine in eastern Switzerland and its selection**).
Schweiz. Z. Obst- u. Weinb. 1950 : **59** : 361–66, 380–86.

The nomenclature and history of Blauburgunder, also known as Pinot Noir in eastern Switzerland and France, are described and the method of clonal selection practised at Wädenswil Experimental Institute is outlined. The aims in selection are yield, quality, vigorous growth and trueness to type. Other work in progress includes a study of the

effect of density of the bunches of grapes upon *Botrytis* infection. Clones with smaller berries and less compact bunches seem to suffer less from the disease.
Among a group of selected vines one has been found which, in nine successive years, has averaged 2% less total acid than the other varieties.
Selection of varieties for use as stocks is also proceeding and one clone, Selektion Wädenswil, has given good results when grafted with Riesling x Sylvaner, the increase in yield of grapes being 18%.

652. Kirillov, F. F. and
Lukjjanov, A. D.
(Successes in viticulture on collective farms on the Don).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 32–35.

Varieties grown in the vineyards of the Rostov province are named. In the Cymbljanskiĭ district the self sterile variety Plečistik [Shoulder] is grown side by side with its pollinating variety Cymbljanskiĭ Černyĭ [Black]. Nearly 85% of the vineyards in the district are planted with these two varieties.

653. Ota, T.,
Akiyama, N. and
Suzuki, K.
(Comparative test of grape varieties in respect of suitability for wine-making. I).
J. Hort. Ass. Japan 1950 : **19** : 39–48.

A series of grape varieties, mainly European, were compared in respect of the following characters: time of maturation, heaviness of crop, resistance to disease, characteristics of the bunch and of the individual berries, acidity, sugar content and colour of the juice, and the composition of the wine prepared from them.

654. Milovanova, L. V.
(The keeping properties of table varieties of grapes).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 7 : 21–23.

The results of chemical analyses of several grape varieties during storage are discussed. The varieties were Nimrang, Taĭfi Rozovyĭ [Pink Taĭfi], Kaš Izjum [Kaš Currant], Ohanez, Karmannyĭ [Pocket], Agadai and the following hybrids bred at the Central Asiatic Station of the USSR Institute of Plant Industry: Pobeda [Victory] from Zabalkanskiĭ [Transbalkan] x Hamburg Muscat, Oktjabrjskiĭ [October] from Nimrang x Karmannyĭ, and Pozdniĭ Negrulja [Negrulj's Late] from Nimrang x Dodreljabi.

655.
(Raisins in Uzbekistan).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 7 : 23–25.

Selection work with vines grown for their dried product at the Uzbek Scientific Research Institute of Viticulture is reported.
In 1947 two useful seedless varieties, Kišmiš Belyĭ Krupnoplodnyĭ [Large Fruited White Currant] and Kišmiš Černyĭ Krupnoplodnyĭ [Large Fruited Black Currant], were released to the industry.
Descriptions are given of varieties developed at the institute in 1948 and 1949.

Kišmiš Belyĭ Krupnojagodnyĭ [Large Berry White Currant].
The grapes are larger than those of the above named white variety. The fruits are round, somewhat flattened, fleshy, golden and transparent. Their sugar and acid content is satisfactory.

Kišmiš Černyĭ Krupnojagodnyĭ [Large Berry Black Currant]
The variety bears attractive dark grapes of oval shape and good flavour. The grapes are larger than those of the black variety mentioned above.

Bedona
This is a seedless variety producing large transparent grapes with an attractive green colour and good flavour.

Husaĭne Kadu
This is the only variety of the Husaĭne group of grapes which when processed makes good raisins. Its grapes are large, fleshy and attractive in appearance. The consistency of its flesh and its flavour are good. The seed is rather too firmly attached to the fruit flesh.

Deli Kaftar
The almost round fruits of the variety have an attractive mauvish pink colour. The fruit has good consistency and good flavour.

Šakar Angur
The grapes have an attractive golden colour with a greenish shade. They are transparent and have good flavour.

Džandžal Kara
The grapes are large, oblong and black, with an attractive lustre and a characteristic flavour.

Štur Angur
The grapes are fleshy, long and have good consistency and a flavour somewhat like marmalade. When processed by one of the modern methods, the dried product of these grapes has an attractive ruby colour.

Tana Kuzy
The grapes of this variety are mauvish pink on one side and pale green on the other, with a refreshing acid flavour.

More recent varieties
Mention is made of several more recently selected varieties, showing promise as grapes for making currants and raisins.
Hybrids 182, 200 and 201, from Nimrang x Kišmiš Černyĭ, bear large seedless grapes.
Hybrids 1488 and 1494, from Katta Kurgan [Katta Mound] x Parkent, produce similar but larger grapes to those of the variety Štur Angur.
Hybrid 300, from Nimrang x Bajan Širei, yields a grape of the Nimrang type but, unlike Nimrang, it has a bisexual flower.
Hybrid 474, from Katta Kurgan x Muskat Vengerskiĭ [Hungarian Muscat], bears large green grapes, with good consistency and a muscat flavour. The dried product is superior to that of Muskat Aleksandriĭskiĭ [Alexandria Muscat].
The varieties Sary Angušty, Ičkimar, Andižanskiĭ Černyĭ [Black Andižan], Babara, Tujatši and Ispisar are being tried for their suitability for the grape processing industry.

656.
(On changing the nomenclature of some varieties of vines in Armenia).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 8 : 56–59.

Changes in the nomenclature of vines grown in Armenia affecting over 40 varieties are discussed.
The writers of a letter, Mustafaev and Mirzojan, object to the changes recommended by the Council of Ministers of the Armenian SSR, and point out the need for referring the question

to the Central Ampelographic Commission. In another letter, Gulkanjan and Katarjjan support the proposed changes where the varieties are indigenous to Armenia. These writers consider that Kišmiš Rozovyĭ [Pink Currant] arose from a bud mutation of Degin Kišmiš [Yellow Currant], which is an Armenian land variety.
In a reply to the correspondence by Gulkanjan and Katarjjan, Mirzojan rejects their thesis on the origin of Kišmiš Rozovyĭ from a mutant of Degin Kišmiš as the first named variety is also found in the Tadžik SSR where Degin Kišmiš is not cultivated.
The correspondence is closed by an editorial note supporting the views expressed by Mustafaev and Mirzojan.

657. Rožanec, G. M.
[The wild vine (*Vitis silvestris* Gmel.) growing in the valley of the Prut].
Botaničeskiĭ Žurnal (Botanical Journal) 1950 : **35** : 294–96.

Description is given of a wild Balkan vine (*V. sylvestris*) which was found in Moldavia. This vine has many features in common with wild vines from the valleys of Dnepr and Dnestr. The wild Prut vine is regarded as useful breeding material on account of its resistance to mildew and low temperatures. Its resistance to *Phylloxera* requires testing.

658. Bekirov, U. I.
(The basis for the raw materials for the cognac industry in Uzbekistan).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 8 : 35–38.

The wines made from Rkaciteli, Bajan Širei and Muskat Aleksandriĭskiĭ [Alexandria Muscat] were found suitable for making cognac in the trials conducted at the Central Asiatic Branch of the Magarač Institute. Other varieties grown in Uzbekistan showing promise as raw material for the brandy making industry are Traminer, Sylvaner, Bahtiori, Parkent, Sultani [Džaus], Saperavi and the Obak group of varieties.

659. Veličko, L. V.
(Varieties of vine recommended for cultivation on allotments of farms in the south).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 30–39.

Over a dozen varieties suitable for cultivation in small vineyards in the south of the USSR are listed. Their descriptions include notes on the time of maturity, productiveness, soil requirements, hardiness and resistance to diseases.
Malingre Ranniĭ [Early Malingre] is recommended as a pollinating variety for Madeleine Angevine which has only female flowers.

660. Bous, A. K.
(Viticulture on South Sahalin).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 8 : p. 54.

European, Far Eastern and Mičurin varieties of vines planted experimentally on southern Sahalin in 1948 were all found to be sufficiently hardy. In 1950 the varietal range was extended by several very early varieties.

661. Rubin, S. M.
(Immediate tasks for viticulturists on collective farms).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 11 : 25–27.

Several productive, hardy and good quality varieties are recommended for cultivation in the vineyards of the Moscow province including Safaĭlov's seedlings, Potapenko's seedlings 7 and 5, Aljfa [Alpha], Taežnyĭ Izumrud [Taĭga Emerald] and eight less hardy varieties suitable for sheltered cultivation against walls.

662. Vites, L. S.
(Mičurin varieties of vines in Birobidžan).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 8 : 54–55.

Of the varieties of vines planted in the Birobidžan Jewish Autonomous Province, Habarovsk Territory, Černyĭ Sladkiĭ [Sweet Black], Malingre Seedling and Severnyĭ Belyĭ [White Northern] showed the greatest promise on account of their hardiness and early maturity.

663. Listov, A. A.
(The cultivation of the vine in the northern zone).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : 40–43.

Malingre Seedling, Černyĭ Sladkiĭ [Black Sweet], Madeleine Angevine and Ranniĭ [Early] Angevine were made standards for the entire Soviet northern zone of viticulture. Besides these varieties, in the Voronež, Kursk, Orel, Kuĭbyšev and Saratov provinces Belaja [White] Chasselas, Rozovaja [Pink] Chasselas and Portugieser [Portuguese] are included in the list of standards.

664. Galet, G.
Observations sur la résistance aux maladies des hybrides producteurs cultivés a l'École de Montpellier. **(Observations on the disease resistance of the hybrid producers grown at the College of Montpellier).**
Progr. Agric. Vitic. 1950 : **133** : 300–07, 325–30, 353–58; **134** : 11–15, 50–53.

A detailed record is presented of the mildew resistance of large numbers of vines at Montpellier which has a collection of about 600.

665. Börner, C.
Die erblichen Grundlagen von Befall und Nichtbefall der Pflanzen durch tierische Parasiten. **(The hereditary principles involved in attack and freedom from attack of plants by insect parasites).**
NachrBl. Dtsch. PflSchDienst. 1949 : **3** : 121–30.

The biological interrelationship between *Phylloxera* races and species and races of vines is considered. Theories of gall formation are discussed, the conclusion being that necrosis is a protective phenomenon.
Experiments with gall forming vines crossed by necrosis producing vines are described with regard to reaction to *Phylloxera*. Segregation occurs according to a positive or negative reaction. In the F_1 the number of negative seedlings either (*a*) increases according to the formula $(2^n–1) : 1$ or (*b*) decreases according to the formula $1 : (2^n–1)$; in the F_2 the number of negative seedlings for case (*a*) increases according to the formula $(4^n–1) : 1$ and for case (*b*) increases according to the formula $3^n : (4^n–3^n)$. An explanation of these results is given, based, in the first case, on the action of an increasing number of dominant, i.e. homozygous or heterozygous, active factors *E*, and, in the second case, on multiple, possibly

polymeric, factors *M*, which only become active when several are present as a group, in which case the *M* groups are not considered mutually interchangeable. There are probably also inhibitory factors *H*, which may counteract the effect of individual *E* and *M* groups. Tabulated results show the effectiveness of the necrosis producing factors of a large number of vines in relation to various *Phylloxera* biotypes. Some biotypes are susceptible to many necrosis producing factors, others only to a few. *Vitis vulpina* (*riparia*), *V. rupestris*, *V. Berlandieri* and *V. cinerea* have various necrosis producing factors which *V. vinifera* lacks. Some vines exhibit necrosis only in regard to the biotype with long proboscis; other vines have factors protecting them against two or more biotypes, and *V. cinerea* has factors effective against all known *Phylloxera* biotypes. The effectiveness of factors may extend to both leaf and root or only to the leaf.
The highly specific reactivity of necrosis producing factors of vines involves the hypothesis of similar factorial differences between *Phylloxera* biotypes.
The author concludes that the necrosis reaction in vines depends on a susceptible biotype encountering a necrosis producing factor which reacts to the biotype and conversely the *Phylloxera* gall is formed if the vine is free from necrosis producing factors, or if the insect is free from lethal factors corresponding to the necrosis producing factors present.

FORESTRY

666.

Växtförädling av skogsträd i Finland. (**Breeding of forest trees in Finland**).
Skogen 1949 : **36** : p. 40.

The Finnish Foundation for Forest Tree Breeding has begun a systematic search for élite trees from which scions will be taken for grafting on stocks to obtain high grade seed. So far about 250 trees, mainly pines, have been chosen from the old forest lands in Eastern Finland.

667.

Årsberättelse över Föreningens för växtförädling av skogsträd verksamhet under år 1949. (**Annual report of the work of the Association for Forest Tree Breeding during 1949**).
Årsberätt. Fören. Växtföräd. Skogsträd 1949 : 3–12.

A change has been made in the mode of presentation of the annual report of the Swedish Association for Forest Tree Breeding. As the work of breeding has reached an advanced stage and now proceeds to some extent according to routine, the main report covers the work of each of the three stations, Ekebo, Brunsberg and Sundmo, in broad outlines, while more detailed reports on special subjects are recorded in separate papers which will also be reviewed in *Plant Breeding Abstracts* if they deal with subjects of special interest to plant breeders (cf. Abst. 669).

Ekebo Station

Deciduous trees

The station claims to have produced the first polyploid progeny obtained by colchicine treatment of a deciduous forest tree, in this case the common alder. The resultant polyploid was crossed with a normal tree and 1400 triploid seedlings ($2n = 42$) were raised. In the first year they proved markedly superior to the diploid trees (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1934). It should now be possible to build up a collection of polyploid trees of different kinds for study.
Interesting birch progenies from artificial crosses in 1948 have been obtained and 15,000 0/1-plants and 32,000 1/0-plants have been raised.
In 1949 about 20 aspen crosses were made, including three of *Populus tremula* x *P. tremuloides*, of which 10,000 seedlings were raised. Interspecific F_2 hybrids of both aspen and birch are to be tested for self regeneration, an important point where such hybrids are required in forest plantation.

Grafts of 15 plus trees of straight fibred *Betula verrucosa* and of 34 oaks have been made for seed production.
The number of birch, elm, alder, oak and ash, taken in 1939 from seed beds for transplanting for progeny or cultivation trials, was 139,000 plants.
Surveys to discover good types of beech and oak were carried out.

Conifers

Very successful grafts of spruce have now been achieved in the open. Various factors affecting open-air grafts are being further studied. Grafts of pine, larch and Douglas fir from undamaged trees in the winter of 1940 are doing well and will provide material for hybridization studies.
Further work on conifers included: the laying down of seed plantations; transplantation of 60,000 conifer seedlings representing 79 progenies; large scale progeny tests and the collection of material for further tests; and finally, surveys in search of good types of spruce.

Brunsberg Station

Extensive grafting and transplanting operations were carried out with pine, spruce, larch, birch and aspen with a view to seed production, progeny testing and studies of nursery practice. Of pine grafts made in the open 86% were successful, i.e. nearly equal to the set obtained with greenhouse grafts.
In collaboration with the National Forest Research Institute, artificial crosses of pine were carried out to obtain, if possible, hybrids between the Swedish pine and American varieties.
Extensive material for progeny trials of pine, spruce, larch and birch is being raised and 14,000 aspen seedlings for tests of hybrid progenies are also in the nurseries, which now contain a total of about 1·3 million plants.

Sundmo Station

Work on pines included studies on germination and multiplication by cuttings. Extensive grafting operations were also carried out on pine, spruce, aspen and birch, and open air grafting of pine, which gave encouraging results, is to be studied further.
Seed for progeny trials was collected from selected trees of pine, spruce and larch in various localities and about 3·2 million plants are now in the nurseries, in addition to 9,000 aspens raised from crosses made in the greenhouse.
Surveys of pine, spruce, aspen and birch were made in Jämtland, Västernorrland and Västerbotten.

668. Stoeckeler, J. H.
Bigger and better forest trees of Sweden.
Sci. Mon. N.Y. 1950 : **70** : 328–32.

A description is given of the work of the Swedish Tree Breeding Institute, visited by the author in 1949.

669. Kiellander, C. L.
Material till fröplantager av tall och gran i Sydsverige. (**Material for seed plantations of pine and spruce in southern Sweden**).
Årsberätt. Fören. Växtföräd. Skogsträd 1949 : 29–39.

A survey is given of the material collected for seed plantations in southern Sweden, with indications on how it is to be used and of future plans in this sphere.

670. Slavin, B. H.
A new hybrid maple.
Nat. Hort. Mag. 1950 : **29** : 103–07.

Acer leucoderme x *A. saccharum* hybrids were grown from seed obtained in Rochester, New York, in 1949. The specimen selected as the type, which has been named *A. senacaensis*, is described. It is a well shaped, spreading tree and has many characteristics intermediate between the parents.

671. Slavin, B. H.
The upright black maple.
Nat. Hort. Mag. 1950 : **29** : p. 103.

A new selection which when budded on ordinary black maple is valuable for ornamental and shade purposes is described. It is narrow and upright in form and grows faster than most of the upright forms of the sugar and Norway maples.

672.
News of the world.
Unasylva 1950 : **4** : 140–44.

The Forest Genetics Institute of Placerville, Calif., which hitherto has been working with pine, is reported to have started hybridization work with Douglas fir. The techniques already worked out for pine had to be adapted because of the difficulty of collecting sufficient pollen from the male catkins and of accurately determining the period of receptivity of the female flowers. The amount of pollen needed is lessened by the use of a new type of pollination syringe which projects a cloud instead of a simple spray of pollen on the cones.
Experiments were conducted on self pollination, intraspecific crossing and crossing *Pseudotsuga taxifolia* with *Ps. macrocarpa*. Germination experiments are reported. Self-pollinated trees produced no sound seed; an artificial intraspecific cross gave seeds of which the great majority were sound; wind-pollinated trees yielded only a very small proportion of sound seeds. Of 438 seeds from a cross *Ps. macrocarpa* x *Ps. taxifolia* only 3 appeared to be sound and even these did not germinate.

673. Schönbach, H.
Stand der Provenienz- und Züchtungsforschung bei Fichte. (**The position in research on provenance and breeding in the spruce**).
Züchter 1950 : **20** : 156–67.

The effect of using seed from various localities in Germany and other countries is discussed. Spruce stands of foreign origin in exposed positions, unlike pine stands, show widespread breakages in upper branches and trunks, whereas adjacent stands of local origin are scarcely damaged. This superiority of the latter, especially found where the stand is the result of natural regeneration, is attributed not only to the race but also to sheltered and slow development of the seedlings. Still, comparative research on provenance has proved that resistance to breaking, frost and other damage largely depends on the race of the spruce.
The cultivation of spruces that shoot late in positions exposed to frost permits of considerably higher production in the first two decades. There is no genetic linkage between cone colour and early or late opening of buds. Late shooting spruces with large green cones will probably belong to races found in lowlands, whereas early shooting spruces with small red cones will probably be of highland origin. The local races of spruces developed by natural selection over thousands of years have everywhere nearly disappeared. The present spruce stands carry the most varied genetic factors in all possible combinations. The most luxuriant and most resistant to organic and climatic damage survive, which, in the case of the spruce, is what is required economically, but this does not hold in the case of pines, where numerous branches are the economic aim.

674. Kiellander, C. L.
Polyploidy in *Picea Abies*.
Hereditas, Lund 1950 : **36** : 513–16. (Abst.).

Observations are reported on colchicine induced and natural polyploids of Norway spruce and their frequency. The possible modes of origin of the natural tetraploids are briefly considered. Both kinds of polyploids were slow growing as compared with diploids.
Colchicine treatment of *Pinus sylvestris*, *P. contorta* var. *latifolia* and *Larix sibirica* also induced slower growth but other deviations were less striking than in spruce.

675. MATTHEWS, J. D.
Precocious Scots pine.
Quart. J. For. 1950 : **44** : 237–38.

For most species there is reasonable evidence of variation in inherent capacity for seed production. Heavy persistent and precocious fruiting is generally coupled with poor vegetative growth and such trees may be of value to the breeder as dwarfing rootstocks on to which scions from selected trees may be grafted and stimulated into fruiting for breeding studies and seed collection.

676. GALJPERN, G. D.
(Forest pine in the USSR).
Priroda (Nature) 1949 : No. 5 : 51–56.

Pinus sylvestris is regarded as a collective entity including different species, types and hybrid forms. *P. hamata* and *P. plana* are the most common species occurring in central Russia, while *P. lapponica*, *P. caucasica* and *P. armena* are included among the ecotypes found elsewhere in the USSR. A brief reference is made to the ease with which hybridization between the Russian and west European pines occurs. The Russian pine is probably a range of hybrid forms of *P. plana* x *P. hamata*. The problem of sexual dimorphism of pines is discussed.

VEGETABLES

677. SAKATA, T.
Japanese seed production.
Seed World 1950 : **67** : No. 3 : 12–14.

Reference is made to vegetable breeding in Japan. Hybrid seed was very popular even before the war.

678. DALBRO, K.
Colchicin-induced chromosome-doubling in horticultural plants.
K. VetHojsk Aarsskr. 1950 : 204–30.

The characteristics of induced polyploids and some aspects of the colchicine technique are reviewed. Descriptions are given of colchicine induced tetraploids of the following plants obtained by the author: spinach, beetroot, cauliflower, green kale, white and red cabbage, Savoy cabbage, Brussels sprouts, Turner cabbage (*Brassica oleracea* var. *Caulorapa*), radish (*Raphanus sativa* vars *radicula* and *major*), garden cress, cucumber, celeriac, parsley, lettuce and several ornamental flower species. It is emphasized that each species responds differently to chromosome doubling and that no general statement can be made concerning the breeding value of tetraploids. In some of the plants listed above, e.g. the cabbages, radishes, cress and lettuce among the vegetables, the polyploids appear to be promising from the practical point of view. Further improvement of tetraploid forms by hybridization and subsequent selection is advocated.

679. JANES, B. E.
Composition of Florida-grown vegetables. II. Effect of variety, location, season, fertilizer level and soil moisture on the organic composition of cabbage, beans, tomatoes, collards, broccoli and carrots.
Tech. Bull. Fla Agric. Exp. Sta. 1949 : No. 455 : Pp. 44.

Fertilizer level and variety influenced the chemical composition of the vegetables studied but their effect was considerably smaller than that of season and locality.

680. HARTMAIR, V.
Ergebnisse der Gemüsesortenversuche des Jahres 1949. (**Results of the vegetable trials for the year 1949**).
VersErgebn. Bundesanst. Alp. Landw. Admont 1950 : No. 5 : Pp. 30.

Varieties of white and red cabbage, cauliflower, lettuce, onion, carrot, yellow turnip, radish, tomato, peas and dwarf bean were tested for their suitability for cultivation in alpine regions; early ripening varieties, including local varieties, were specially observed. The external and internal qualities of white cabbage, carrots and peas, grown on high land under various conditions of altitude and climate, were studied.

681. LAMM, R.,
TOMETORP, G. and
HINTZE, S.
Klassificerande sort- och stamförsök med köksväxter 1945–1948. (**Classificatory, variety and strain trials with vegetables 1945-48**).
Berätt. Alnarps Lantbr., Mej. o. TrädgårdsInst. 1949 (1950) : 97–152.

The new varieties and strains are listed that have been awarded the designation first class élite or first class in Swedish trials in 1948. The list comprises lettuce, tomatoes, kale, cauliflower, Brussels sprouts, white cabbage, forcing carrots and field carrots, parsley, parsnips and garden beet (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts. 1351 and 1354).

682. NILSSON, F. and
LARSSON, G.
Sortförsök med köksväxter i Norrland. V. Rödbetor och morötter 1945–1948. (**Variety trials with vegetables in Norrland. V. Gardens beets and carrots 1945-48**).
Berätt. Alnarps Lantbr., Mej. o. TrädgårdsInst. 1949 (1950) : 173–214.

Particulars are given of the performance of four varieties of beet and five varieties of carrot tested in trials in many localities in northern Sweden. No new names appear among the varieties chosen for the tests (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1352).

683. FRANKLIN, D. F.
Imperida : a new bunching carrot.
Circ. Idaho Agric. Exp. Sta. 1950 : No. 116 : Pp. 3.

The original selections from which Imperida has been derived were obtained from natural hybrids between the carrot Imperator and another variety, probably Red Cored Chantenay. The chief advantage of the new variety is its suitability for bunching on account of its short tops. The roots are long conical in shape, with square shoulders, level crowns and medium to long root tips.

684. LAMPRECHT, H. and
SVENSSON, V.
Zwei Chimären von *Daucus carota* L. sowie allgemeines über Art und Entstehung von Chimären. (**Two chimeras of *D. carota* L. with general observations on the nature and origin of chimeras**).
Agri Hortique Genetica, Landskrona 1949 : **7** : 96–111.

Previous work on plant chimeras is reviewed, as well as their occurrence in self-pollinated plants. Four main types of plant chimeras are discussed. Two sectorial chimeras in the carrot are recorded: (*a*) one in which half of the root contained carotene and was red and

the other half lacked carotene and was a clear yellow; and (*b*) another type of chimera in which one half of the root resembled that in the ♀ parent, Amager, while the other half was shorter and closely resembled that found in London Torg [London Market] (= Chantenay). Type (*a*) is attributed to a somatic mutation of a gene *car* to *Car*, and type (*b*) to a single recessive gene probably identical with that operating in Chantenay.
The various ways in which chimeras may arise, their classification and their genic or cytological nature are briefly considered.

685. Sagalovič, E. N.
(Selecting seed from carrots planted in the summer).
Sad i Ogorod (Fruit and Vegetable Gardens) **1949** : No. **9** : **44–47.**

Recent experiments in the southern and central USSR showed that carrots planted in the summer produced healthier and more productive plants than carrots sown in the spring. In all trials the seed obtained from summer planted carrots gave significantly higher yields of roots. The varieties used in the different experiments included Nantes and Chantenay.

686. Whitaker, T. W.
A note on the cytology and systematic relationships of the carrot.
Proc. Amer. Soc. Hort. Sci. **1949** : **53** : **305–08.**

The chromosome number of 17 wild and cultivated forms of carrot was found to be $2n = 18$. The cytological observations reported suggest that neither polyploidy nor gross structural rearrangement of the chromosomes is associated with the differentiation of the varieties and forms of *Daucus Carota*.

687. Fedorov, G. V.
(A promising crop).
Sad i Ogorod (Fruit and Vegetable Gardens) **1949** : No. **10** : **60–61.**

Reference is made to a new variety of oriental radish, which has good keeping properties. The new radish was obtained at the Institute of Vegetable Farming, Moscow, by direct training, Mičurinite selection of the parent forms for the intraspecific cross, and individual selection.

688. Nishiyama, I.
(Breeding of cold-resistant *Raphanus sativus* by the doubling of chromosome number).
Bot. and Zool. **1942** : **10** : **57–58** [from Jap. J. Bot. **1943** :**12** : Abst. **192**].

Colchicine induced tetraploids of *R. sativus* are characterized by vigorous root growth. In the strain Minowase the root weight of normal plants was 20 to 220 grm. and that of the tetraploid 60 to 620 grm. The gigantism is especially marked in the root but shows also in other parts. Owing to greater cold resistance the tetraploid may be safely cultivated much later in the season than the diploid.

689. Jones, H. A.,
Perry, B. A. and
Edmundson, W. C.
Vegetative propagation of short-day varieties of onions as an aid in a breeding program.
Proc. Amer. Soc. Hort. Sci. **1949** : **53** : **367–70.**

In cooperative breeding work between the Texas Agricultural Experiment Station and the US Department of Agriculture, a procedure has been devised for the maintenance and

vegetative multiplication of short day varieties of onions which have a short rest period. Varieties such as Yellow Bermuda or Crystal Wax are harvested in Texas during late March or early April. They are sent to Colorado, where they are stored until about 15 July and then planted; the resulting plants produce several branches and under conditions of high temperature and long days clusters of bulbs are formed which can be stored until required for seed production.

690. CLARKE, A. E. and
POLLARD, L. H.
The amount of self-pollination in male-sterile onion lines.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 299–301.

In genetically male sterile lines of onion varieties certain plants produce a little good pollen and in some cases selfed seed has been obtained. Experiments have therefore been carried out to determine the amount of selfing which might occur in male sterile lines being used in the production of F_1 hybrid seed. By means of appropriate marker genes, the average amount of selfing for all lines was found to be 4·1% under cage conditions; thus selfing does not present a serious problem in the maintenance of stocks and production of hybrid seed. It is pointed out that under field conditions the percentage of selfs might be even lower. It was also discovered that certain male sterile plants tend to produce more selfs than others; scope therefore exists for reducing the amount of selfing by selection.

691. FOSKETT, R. L. and
PETERSON, C. E.
Relation of dry matter content to storage quality in some onion varieties and hybrids.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 314–18.

Experiments with 60 varieties and hybrids are reported which show that the refractive index may be used as a method of estimating the approximate dry matter percentage, and that there is a tendency for varieties and hybrids having a high percentage of dry matter to be less susceptible to sprouting during storage than those with a low dry matter content. On this basis varieties, hybrids and inbreds can be roughly classified for storage quality. Two exceptions to the general rule are White Portugal and Utah Sweet Spanish. Iowa Yellow Globe 44 which had the lowest sprouting percentage of any variety tested and was developed from long keeping inbreds of Brigham Yellow Globe shows that the development of good keeping quality can be accomplished through inbreeding and selection. Brigham Yellow Globe had a sprouting percentage of 34·7 on April 4th, as compared with 3·9% for Iowa Yellow Globe on the same date.

692. MELLER, S.
(Common onion varieties in our country).
Hassadeh 1950 : **30** : 228–29.

Onion varieties are described including Mitsri Meshobah [Praiseworthy Egyptian], Sefardi Bakir [Early Spanish] and Golden Bermuda. Shallots introduced into Israel from Syria and Lebanon are of two types, the Egyptian and Syrian Mori; no pure seed is available and crop yields are uneven. Turkish shallots recently introduced keep well in storage.

693. COCHRAN, F. D.
A study of the species hybrid, *Allium ascalonicum* x *Allium fistulosum* and its backcrossed progenies.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 293–96.

The purposes of the cross were to incorporate greater disease resistance into a shallot type plant and to study meiosis in the hybrid and back crosses. The cytological findings are reported in this paper. The parents each form 8 bivalents at meiosis. In the F_1 there

were numerous meiotic irregularities including multivalent association and lack of pairing. The chiasmata were random and fewer than in either parent. There were 6 to 11 chromosomes in the microspores. From 6·2 to 9·7% of the pollen grains were stainable.
Back-crosses were made to each parent with the F_1 as pollen parent, the reciprocal crosses being unsuccessful. In 104 back-crosses to *A. fistulosum*, 47 plants had localized chiasmata, 42 had randomized chiasmata and 15 had both, but only rarely were the two types of bivalents found in more or less equal numbers in a plant. The type of chiasma formation appears to be autonomously determined and controlled within the chromosomes themselves. The occurrence of only 14% of plants having both types of chiasma formation indicates that the gametes containing a mixture of *A. ascalonicum* and *A. fistulosum* chromosomes and their cross-overs were for the most part non-viable or failed to function in competition with those nearer one or other parental type.
All the *A. ascalonicum* back-crosses examined had randomized chiasma formation. About half the plants showed fairly normal pairing and the rest were cytologically irregular. This further substantiates the statement that the functional gametes are those nearest the parental types. The plants showing meiotic irregularities were morphologically somewhat similar to the F_1 parent.

694. Vološanovič, K. A.
(Original varieties of winter garlic in the Černovickaja province).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 58–61.

Two Moldavian land varieties of garlic bearing flowering stems and reproducing from aerial bulbs and cloves alike are described.
Moldavskiĭ [Moldavian] is cultivated in the steppe zone. The outer scales of its bulbs are off-white. The larger bulbs have as many as six scales. The cloves and bulbs of two year old garlics have dusky pink scales, while the bulbils are either pale mauve or pale yellow. The weights and numbers of cloves and bulbils produced per plant varied according to the mode of reproduction and the age of the plants.
Strelkujuščiĭ [Bolting] is grown extensively in the woody zone of the alpine foothills. The bulbs of this variety, grown from bulbils, weighed less and produced a smaller number of cloves when they were grown from cloves. The weights and the numbers of cloves and bulbils in the second, third and fourth year increased progressively. The bulbs of Strelkujuščiĭ have off-white scales frequently interspersed with little mauve veins. The cloves have a firm outer scale of dusky pink to mauvish brown. The aerial bulbs are usually mauve, but sometimes have pale yellow scales. The same plants might produce bulbils with scales having different colour. The variety shows promise as breeding material because of the ease of its propagation. The aims are productive varieties producing bulbs with more and smaller cloves and stems bearing more and larger bulbils. No further improvement of the flavour and keeping property is required.

695. Gramenickaja, V. G.
(A bacterial disease of garlic).
Priroda (Nature) 1949 : No. 5 : 49–50.

A bacterium pathogenic to garlic is being studied at the Institute of Applied Zoology and Phytopathology, Leningrad. The disease was observed on a sample of garlic originating from central Asia and stored at Leningrad. The ability of the organism for attacking a host possessing such strong bactericidal properties as garlic is referred to as a good example of the adaptability of bacteria.

696. Panov, M. A.
(The growing of artichoke seed).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 12 : 55–57.

Breeding artichokes for earliness at the Timirjazev Agricultural Academy is reported. This work has been necessitated by the extinction, during the war years, of the variety 041

which was developed at the Maĭkop Vegetable Station of the USSR Institute of Plant Industry. Some progress in the selection work with Ranniĭ Fioletovyĭ [Early Mauve] originating from France was made. Dry vernalized seed of this variety was grown in the open without transplanting. The plants showed great irregularity in development. The seed of the early forms was selected.

697. Cox, J. A.,
Montelaro, J.,
Moreau, A. and
Spurlock, D.
Growing cabbage in Louisiana.
La Agric. Ext. Publ. 1950 : No. 1043 : Pp. 15.

Descriptions of varieties for growing in Louisiana are included.

698. Odland, M. L. and
Noll, C. J.
The utilization of cross-compatibility and self-incompatibility in the production of F_1 hybrid cabbage.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 391–402.

Data are presented to indicate the degree of heterosis in cabbage hybrids. Preliminary studies of combining ability are being carried out by the authors. Sexual reproduction in cabbage is discussed and the genetical basis of sterility, which involves oppositional factors, is explained. A procedure is then outlined for the production of hybrid seed without resorting to hand pollination.
An account is given of experiments which indicate that seed set is slightly influenced by temperature. In maintaining or increasing inbred self incompatible lines the best results may be obtained by maintaining a relatively cool temperature during the seed setting period, whereas in the study of the genetics of incompatibility relatively high temperatures may be desirable.
Bud pollination may be used to maintain and increase inbred lines but is not suitable for the production of any great quantity of seed.
Four plants have been discovered which set considerably more selfed seed than normal self incompatible Penn State Ballhead plants.
A study of asexual reproduction as an aid in increasing inbreds for hybrid production is also reported.

699.
Develop new collard variety.
Seed World 1950 : **67** : No. 5 : p. 32.

Vates is a well coloured, hardy variety developed at the Virginia Truck Experimental Station. It is non-heading, low growing and broad with thick leaves having a high ratio of blade to stalk. The station now has about 20 different selections of Vates most of which show considerable improvement in type over the older varieties. It is intended to multiply several of them for distribution in 1951.

700. Olthoff, B. H.
Kruisbestuivingsgevaar bij Brassica's. (**Danger of cross pollination in *Brassica*).**
Maandbl. Landbouwvoorlichtdienst, 's-Gravenhage 1950 : **7** : 229–31.

In a previous paper, the author used a classical classification of the genus, which is modernized here. Dangers of cross pollination between the species reported in the literature are referred to, as is Sneep's observation that the risk is slight between sub-varieties *biennis* and *annua* of *B. Napus* var. *oleifera.*

701. Morgan, C. N. and Henderson, A. F. C.
Vegetable production. Whiptail in cauliflowers.
Qd. Agric. J. 1950 : **70** : 338–41.

Varietal differences in susceptibility to whiptail, a disease due to molybdenum deficiency in the soil, have been observed at the Redlands Experiment Station, Queensland.

702. Fulton, J. P.
Studies on strains of cucumber virus 1 from spinach.
Phytopathology 1950 : **40** : 729–36.

A detailed study was made of six isolates of cucumber virus 1 obtained from field grown spinach in Arkansas. The isolates, designated strains A, B, C, D, E and F, produced varying symptoms on selected host plants. When the virus strains were inoculated into seven varieties of spinach susceptible to cucumber virus 1, the difference in symptoms produced by the strains was much greater than any variation attributed to a difference in the spinach variety. The varieties Old Dominion and Virginia Savoy, developed primarily for their resistance to cucumber virus 1, were found to be resistant to five of the six strains under greenhouse conditions, although a certain percentage of plants became infected with each strain. These two varieties were completely susceptible to strain D. The susceptibility of some plants to the other five strains can possibly be explained on the basis of the heterozygous nature of Old Dominion and Virginia Savoy, but this may not be the correct explanation since these susceptible plants reacted in a manner not typical of the reaction of the susceptible spinach varieties to cucumber virus 1. The need for additional work on the nature of the resistance of Old Dominion and Virginia Savoy is indicated.

703. Hartmair, V.
Eine künstlich erzeugte fertile tetraploide Melone. (**An artificially produced fertile tetraploid melon**).
Bodenkultur, Wien 1950 : **4** : 142–44.

Two varieties of *Cucumis Melo* L., var. *pubescens* and var. *flexuosus*, were treated with colchicine. Chimeras were found in the case of var. *pubescens* only. The supposedly tetraploid plants from this variety died whereas the tetraploids from var. *flexuosus* were of very luxuriant growth. They differed from the diploid plants in the following respects: the internodes were thicker and shorter, the leaves darker, larger and more numerous, the petioles thicker and more curved, the flowers nearly twice as large and fully functioning in both sexes; the ♀ flowers had enlarged stigmatic lobes and thickened, pubescent ovaries; the seeds were larger and heavier, their 1000 seed weight being 74 grm. compared with 40 grm. for the diploid. The tetraploid plants showed a remarkably good set of seed, thus a single pollination of a tetraploid S_2 plant gave 130 good seeds capable of germination. The progeny of the first and second generation retained unchanged the habit described above. The form of *C. Melo* var. *flexuosus* chosen for the experiment was apparently specially suitable for artificial doubling of the genome. It is suggested that the tetraploid and diploid forms should be compared under suitable climatic conditions in the field.

704. Asadov, G. F.
(**The Dutma melons**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 10 : p. 68.

The Dutma melons cultivated in Azerbaĭdžan are distinguished from other melons by the special cultivation methods they require; their flowers are covered up with soil from the time of fruit setting until the fruits reach maturity. The best varieties of this melon are Agačanabatj, Kamkar, Koĭtorlama, Gasanabaki, Šineĭvaz and Askerhany.

705. Bohn, G. W. and
Whitaker, T. W.
A gene for male sterility in the musk melon (*Cucumis Melo* L.).
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 309–14.

A male sterile mutant discovered in the musk melon produces staminate and hermaphrodite flowers with small indehiscent anthers containing empty pollen cells in tetrads. The mutant is controlled by a single recessive Mendelian factor; no evidence that cytoplasmic factors are involved in its inheritance was obtained. Meiosis was apparently normal. The mutant has potential value in both breeding work and the production of F_1 hybrids for commercial cultivation.

706. Andrus, C. F.
Factors influencing breakage resistance in water melons.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 319–22.

Water melon varieties have been studied at the US Regional Vegetable Breeding Laboratory, Charleston, S.C. with a view to gaining information on resistance to breakage for application in breeding. Direct measurements of the breakage resistance of cut sections indicate that the greater part of resistance is due to the characteristics of the flesh. Toughness of the rind is second in importance; diameter of the melon and thickness of the rind were found to be relatively minor factors influencing breakage. Tests should be based on not less than 50 melons and possibly as many as 200 melons of each variety.

707. Curtis, L. C. and
Scarchuk, J.
Dimorphic female blossom and fruit types.
J. Hered. 1950 : **41** : 87–90.

A plant in a segregating line of *Cucurbita Pepo* bore normal female blossoms, producing elongated fruit, and also modified female flowers, producing spherical fruit. Seeds from selfing of these flowers all gave rise to plants bearing the two types of female flowers and fruit. There appeared to be no definite pattern of production of the dimorphic flowers along the stems. The production of the two types of flowers and fruit is considered to be due to genetic rather than environmental factors. It is suggested that normally two different chemical substances are responsible for the production of male and female blossoms, but that in this particular line of *C. Pepo* three different substances are involved in the differentiation of the male flowers and two types of female flowers.

708. Buchinger, A.
Der Steirische, schalenlose, langtriebige Ölkürbis. (**The Styrian long stemmed, soft seeded oil pumpkin**).
Bodenkultur, Wien 1950 : **4** : 217–33.

This paper is a review on the above variety which yields a high percentage of oil.
In future breeding, certain characteristics should be aimed at, such as long stems, the production of 4 or 5 shoots per plant, early branching off of the side shoots, medium large fruits, extremely large sizes being undesirable, seeds with no tendency to premature germination whilst inside the fruit, improved keeping properties and in this connexion, tolerance of heavy nitrogen manuring. The Styrian long stemmed, soft seeded oil pumpkin, is a dual purpose plant, both flesh and oil being utilized, and in any further breeding for improvement in flavour the dual purpose type should be maintained. Study of the development, time of shooting, time at which the stem begins its rapid increase in length, flowering time of ♀ and ♂ flowers and time of ripening is necessary. Though Styria is a

healthy region for pumpkin growing, investigation of resistance to climatic influences, diseases and pests is also desirable.
Breeding by selection and by hybridization is to be begun. Heterosis breeding will also be investigated.
Tschermak-Seysenegg's short stemmed, soft seeded oil pumpkin, a hybrid in which the ♀ parent is the Styrian pumpkin, has smaller fruits and seeds than the long stemmed pumpkin discussed above.

709. YASUDA, S.
(Metaxenia-like phenomena observed in squash).
Bot. Mag. Tokyo 1942 : **56** : 182–85 [from Jap. J. Bot. 1943 : **12** : Abst. 231].

The strain Tirimen is distinguished by prominent excrescences on the surface of the fruit, while Sisigatani has only small excrescences. The fruit of the cross between the two varieties resembles the male parent, Tirimen, in this respect. The author considers that this phenomenon should probably be regarded as a form of metaxenia.

710. IWATA, Y.
[Specialization in *Pseudoperonospora cubensis* (Berk. et Curt.) Rostow (II). Comparative studies in the morphology of the fungi from *Cucumis sativus* L. and *Cucurbita moschata* Duchesne].
Ann. Phytopath. Soc. Japan 1942 : **11** : 172–85 [from Jap. J. Bot. 1943 : **12** : Abst. 146].

Observations are recorded concerning the different dimensions of the conidia and conidiophores and the number of branches in *Ps. cubensis* from *Cucumis sativus* and *Cucurbita moschata*. On the basis of these and other data the author concludes that the fungi from the two hosts represent different biological races.

711. RAJASEKHARA MUDALIAR, C.
An early pumpkin variety.
Indian Fmg 1949 : **10** : p. 563.

An early pumpkin known locally as Vellari mathan in the Malabar district, Madras, has been established as *Cucurbita maxima* var. *badagarensis*. The fruits ripen in 90 to 100 days from the time of sowing.

712. WHITAKER, T. W.
Polyploidy in *Echinocystis*.
Madroño, Lancaster, Pa 1950 : **10** : 209–10.

E. macrocarpa has $2n = 32$ chromosomes, in contrast to the 16 chromosomes reported for the other investigated species of the genus. Occasional multivalents and bridges occur at meiosis, which however is otherwise normal. The fruits and seeds of *E. macrocarpa* are thought to show gigas characteristics.

713. SHIFRISS, O.
Spontaneous mutations in the American varieties of *Cucumis sativus* L.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 351–57.

Various mutations discovered by the author are described. They include a plant with leafy flowers and tendrils and superior ovaries; a recessive pleiotropic gene mutation determining

male and female sterility in several varieties, characterized by failure of anthesis; a recessive gene mutation causing fasciation of the stem; two cases of variegation probably caused by somatic mutations; and autotetraploids. None of these mutations is considered valuable in the development of horticultural varieties.
The frequency of occurrence of new distinct qualitative mutations is very low in slicing varieties of *C. sativus* grown in the USA. The stability of the species in the USA is contrasted with its genetic variability in Asia. It is emphasized that the frequency of occurrence of mutant plants in commercial fields is not equivalent to the actual rate of gene mutations. The Asiatic forms are regarded as an important reservoir of genes determining such characters as disease resistance, plant vigour, fruiting habits and flesh qualities.

714. V., A.
Virginia tomato tested in southern States.
Seed World 1950 : **67** : No. 5 : p. 12.

The variety VPI No. 12 developed at Virginia Experimental Station by H. L. Price and H. Huddleson and further developed and tested by the vegetable section at the station was introduced into the Southern Cooperative Trials in 1949. It shows promise as a producer of high quality, solid fleshed fruit.

715. V., A.
Africa adopts U.S. tomato.
Seed World 1950 : **67** : No. 5 : p. 20.

The development of the *Fusarium* resistant variety Durbot which was bred in Missouri and is proving useful in the Transvaal is described (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1229).

716. Magelli, E.
La coltivazione del pomodoro in provincia di Piacenza. (**The cultivation of the tomato in the Province of Piacenza**).
Ital. Agric. 1950 : **87** : 224–29.

Brief descriptions are given of some American and Italian varieties of tomatoes with some notes on yields obtained in different localities in Piacenza. The Italian material mentioned includes artificial hybrids produced by Forlani and some natural crosses between Genovese and S. Marzano. The latter variety has been recently improved by individual selection from pedigree stock.

717. Manunta, C.
Ricerche sui pigmenti del pomodoro in varie razze ed incroci. (**Investigations on the pigments of the tomato in different varieties and crosses**).
Genetica Agraria, Roma 1948 : **1** : 351–59.

Using chemical analysis, chromatographic isolation and spectroscopic identification, the author has estimated the content of β-carotene, lycopene and lutein in five varieties of tomatoes and six hybrids from crosses between them. The F_1 hybrids showed complete or almost complete dominance of the factors determining red pulp, i.e. the capacity to synthesize lycopene, and yellow skin.

718.
The Francis C. Stokes Co. . . .
Seed World 1950 : **67** : No. 5 : p. 46.

Reference is made to new "Stokescross" tomato hybrids, of which there are four, a fifth being due for introduction in 1951. These F_2 hybrids are reported to show yield increases as high as 40% over older varieties and to be of superior quality. The breeding programme is being carried out by the Francis C. Stokes Company in New Jersey and Cuba.

719. Campbell, J. A.
Good traits in new lines of tomatoes.
Miss. Fm Res. 1948 : **11** : No. 12 : 1, 8.

At the Truck Crops Branch Experiment Station practically all the commercial tomato varieties grown in the United States have now been tested to determine the best ones to use for crossing with disease resistant strains of wild species to develop better varieties. An account is given of the breeding programme in which crosses were made with *Lycopersicon pimpinellifolium* and the progeny subjected to several years' selection. Tests have shown that several of the lines thus obtained are superior to Rutgers in yield of marketable fruit and are highly resistant to *Fusarium* wilt.
The results of variety trials are presented, in which lines produced at the Truck Crops Station were included. A canning quality test of the two highest yielding lines and Rutgers is also reported.

720. Wittwer, S. H.
Effect of fruit setting treatment, variety and solar radiation on yield and fruit size of greenhouse tomatoes.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 349–54.

Fruit setting treatments consisting of mechanical vibration and hormone sprays were used in raising spring and autumn crops of tomato varieties in the greenhouse. All of the seven varieties grown for the spring crop showed significant increases in fruit size as a result of the fruit setting treatments, but only the American forcing types gave significant increases in yield. The nine varieties forming the autumn crop showed significant increases in yield but no significant differences in fruit size. In both crops marked varietal differences in response to the treatments were noted. Varietal and seasonal responses are discussed in relation to the changing day-to-day pattern of solar radiation.

721. Lamm, R.
Self-incompatibility in *Lycopersicon peruvianum* Mill.
Hereditas, Lund 1950 : **36** : 509–11. (Abst.).

Experiments with six seedlings and their progeny are described which support the suggestion that *S* genes control the mating system of *L. peruvianum*.
Some of the young seedlings were treated with colchicine and two autotetraploids were obtained, one of which was self incompatible, the other giving a few seeds when selfed. Hybrids between the two plants were obtained and some crosses were made within this progeny. Considerable differences in seed production were noted between reciprocal combinations of autotetraploids.
Incompatible pollen tubes grow slowly and have abnormally swollen ends.
L. peruvianum and *L. hirsutum* were observed to be pollinated at Alnarp by certain insects, especially Syrphidae.

722. Ključareva, M. V.
(The chromoplastids of tomatoes).
Agrobiologija (Agrobiology) 1950 : No. 3 : 146–48.

Cytological investigations of tomato fruits at the Laboratory for Genetics and Breeding of the Odessa State University are reported. The material consisted of vegetative hybrids including the vegetative hybrid between Zolotaja Koroleva [Golden Queen] and Ficarazzi. The initial varieties used for vegetative hybridization gave the controls.
The results suggest that (1) the chloroplasts disintegrate, diffuse and become invisible and their pigment disappears at the time the fruit attains its maximum size, and (2) the red and yellow plastids are then formed anew as a result of a complete reorganization of the cell. .

723. Brežnev, D. D.
(Selecting vegetable varieties for screened cultivation).
Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 9 : 47–50.

The need for vegetable varieties particularly adapted to cultivation in greenhouses is illustrated by experiments with tomatoes conducted at the USSR Institute of Plant Industry.
At Sverdlovsk, trials with 58 varieties showed that the productive outdoor varieties Bison and Tuksvud were less adapted to greenhouse cultivation than Regina, Pervaja Žatva [First Harvest], Lučšii iz Vseh [Best of All], Ailsa Craig, and Pierrette, all of which yielded remarkably well. The cultivation of these varieties in greenhouses and their use in selection of varieties adapted to indoor cultivation are recommended.
In the experiments at the Arctic Research Station, Skorospelka [Early Ripening] and Bison of Krasnoufimsk provenance outyielded all the other varieties, including Budennovka [Budennyĭ], Bonny Best, Gruntovyĭ Gribovskiĭ [Gribovo Outdoor] and Pierrette when grown in the greenhouse during the spring and summer months. The same varieties yielded less when they were grown in winter. The most productive winter varieties were Lučšii iz Vseh which outyielded the standard Korolj Rannih [King of the Earlies], Marglobe, Gruntovyĭ Gribovskiĭ and Planovyĭ [Plan]. The Bison from Hibiny was more productive than the Bison from Krasnoufimsk when grown in winter. Mention is made of a new tomato variety Puškinskiĭ selected at the USSR Institute of Plant Industry which yields well indoors near Leningrad but is unproductive under greenhouse conditions at the Arctic Research Station.

724. Williams, P. H.
The resistance of some American tomato varieties to *Verticillium* wilt.
35th Rep. Exp. Res. Sta. Cheshunt 1949 : 27–28.

The American tomato varieties Simi, Southland, Essar and Riverside were tested with the most recently isolated culture of *V. albo-atrum* in the station collection. Only Essar remained completely healthy, the other varieties showing varying degrees of susceptibility. None of the varieties would be suitable for commercial cultivation in Great Britain.

725. Frazier, W. A.,
Dennett, R. K.,
Hendrix, J. W.,
Poole, C. F. and
Gilbert, J. C.
Seven new tomato varieties resistant to spotted wilt, *Fusarium* wilt and gray leaf spot.
Bull. Hawaii Agric. Exp. Sta. 1950 : No. 103 : Pp. 22.

Descriptions are given of the tomato varieties Oahu, Lanai, Hawaii, Maui, Molokai, Kauai and Niihau, each of which combines resistance to spotted wilt, *Fusarium* wilt and grey leaf

spot. Each has such a complex parentage that it is not possible to denote the contributions made by each parent with regard to resistance to the diseases, but probably *Lycopersicon pimpinellifolium* contributed the factors for resistance to the three diseases, either directly or indirectly. *L. peruvianum* may also have contributed genes for disease resistance. The method used for detecting combined resistance to the three diseases is outlined. When grown at the recommended elevations the seven varieties are all capable of producing heavy yields of fruit. The varieties produce larger sized fruit than Pearl Harbor, and are earlier and higher yielding under warm conditions than any other disease resistant commercial tomatoes available in Hawaii. In cool wet weather at high elevations in winter the varieties are not so well adapted, being highly susceptible to early and late blight and less vigorous than Rutgers. The possibility of using the new varieties in more vigorous F_1 hybrids at high elevations is now being explored; the resistance to spotted wilt, *Fusarium* wilt and grey leaf spot would be maintained in the F_1 generation since resistance to these diseases is dominant. With the exception of Kauai the varieties are determinate.

726. Oppenheimer [Openhimer], Ch.
(Experiments with tomato varieties).
Hassadeh 1950 : **30** : 225–28.

Of tomato varieties under trial near the Dead Sea, on soil that is flooded in autumn, the variety Marmande remained unrivalled among early varieties, while Pearson gave the best results among the late varieties. The varieties Bonny Best, Scarlet Dawn and Glovel are recommended for canning. The trials have been in progress for four years.

727. Dolan, D. D. and
Christopher, E. P.
The effect of soil and climate on the early and total yield of vegetables grown at three Rhode Island locations.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 359–66.

Varietal trials of tomato, cabbage and cauliflower are reported. The tomato trials included several F_1 hybrids; varieties and hybrids giving the highest early yields were Earliana x Redcap, Valiant x Earliana, Waltham Trellis x Earliana, Earliana and Red Cloud; in total yield Waltham Trellis x Earliana, Valiant x Earliana, Pritchard, Sioux x Wasatch Beauty and Redcap were outstanding.

728. Ustinova, E. I.
(A description of the interspecific hybrids of *Hibiscus esculentus* x *H. Manihot*).
Priroda (Nature) 1949 : No. 6 : 58–60.

The breeding methods used in the Russian experiments to overcome incompatibility between these species included the use of mixed pollen, repeated pollination and admixture to the pollen of particles of the stigma of the male parent. Only *H. esculentus* x *H. Manihot* yielded seed, the reciprocal cross being unsuccessful. The seed was grown in the Moscow province.
The F_1 had a growth period and growth phases which were intermediate between those of the parent forms. The longest phase was that between the shooting stage and the differentiation of the flower buds. In this respect the F_1 resembled the male parent forms, but Mičurinite training and selection is expected to give highly productive forms with short growth periods. The F_1 was superior to both parents in respect of greater thickness and length of the stems, length of internodes and the size of leaf blades. It was intermediate in leaf shape and the hair characters of stems, leaves and fruits. The yellow colour of the corolla, characteristic of *H. Manihot*, predominated over the cream corolla colour of the female parent. The hybrid plants possessed great vigour. They could be back-crossed to

their female parent, and as a result of such crosses, which presented no difficulty, gave early forms with growth periods between 85 and 88 days. The degree of sterility was high both among the F_1 and F_2 plants. Study of the reduction division and the development of the ovules in the F_1 hybrids showed that the sterility was due to a disruption of reduction division during sporogenesis of the pollen grains and embryo sac. Some fertile F_1 and F_2 hybrids, remarkable for their vigour, were selected.
Because of the high degree of sterility in the sexual intergeneric hybrids vegetative hybridization was begun in 1948. *H. Manihot* was used as stock and *H. esculentus* as scion. The grafts were made in a heated greenhouse, but afterwards the grafted plants were grown in the open. The grafts took well, especially when the stock was at an early stage of development at the time the operation was carried out. Some seed has been collected from the grafted hybrids, which grow and mature normally under Moscow conditions.

729. Levan, A. and
Lofty, T.
Spontaneous chromosome fragmentation in seedlings of *Vicia faba*.
Hereditas, Lund 1950 : **36** : 470–82.

Spontaneous chromosome fragmentation occurs immediately after germination in the bean variety Getinge småfröiga [Getinge Small-seeded], the rate being greatest at the start and dropping to zero at about the seventh day. Spontaneous fragmentation occurs almost exclusively in the proximal third of the chromosomes concerned, and far more breakages occur in subterminally attached chromosomes in comparison with submedially attached chromosomes than would have been expected.

730. Campbell, J. A.
Contender, new snap bean, released to growers after experiment station tests.
Miss. Fm Res. 1949 : **12** : No. 12 : 1, 5.

An account is given of the origin and performance in comparison with other varieties of the new variety Contender (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1985). Tests in nine states have shown that it is well adapted to a wide range of climatic conditions.

731. Bowers, J. L. and
Jenkins, W. F.
Snap bean line leads in station tests.
Miss. Fm. Res. 1949 : **12** : No. 11 : p. 3.

The results are presented of comparative trials of varieties and breeding lines carried out in 1949. B1625–17, subsequently referred to as Contender (cf. Abst. 730) gave the highest yield of marketable pods.

732. Iwami, N.
(Ecological studies on beans. I. Set of pod in different varieties in relation to temperature).
J. Hort. Ass. Japan 1950 : **19** : 68–75.

Ten Japanese bean varieties were tested to ascertain the effect on pod setting of high temperature. In general, high temperature reduced the set, but the varieties varied widely in their susceptibility to this effect.

733. Bain, D. C.
Seasons, varieties and yields factors considered in bean seed treatment study.
Miss. Fm Res. 1949 : **12** : No. 5 : p. 3.

The experiments reported show the existence of varietal differences in response to chemical treatments of the seed.

734. Rod, J. and
Wagner, M.
Příspěvek k posouzení jakosti jedlých fazolí. (**A contribution to the evaluation of the quality of table beans**).
Sborn. Českosl. Akad. Zeměd. 1949 : **23** : 116–24.

The cooking properties of 35 varieties of French beans were studied at the Breeding and Genetical Institute of the State Scientific Research Institutes of Plant Industry in Brno, Czechoslovakia. The length of time required by the grains to swell is recommended as a preliminary method for testing the cooking properties.

735. Lefèvre, P. C.
Bruchus obtectus Say ou bruche des haricots (*Phaseolus vulgaris* L.).
[***B. obtectus* Say or the bean (*Ph. vulgaris* L.) weevil**].
Publ. Inst. Nat. Agron. Congo Belge 1950 : No. 48 : Pp. 65.

Tests of bean weevil resistance, carried out in the Belgian Congo with 20 of the best varieties of *Ph. vulgaris* from the Mulungu Station, reveal marked varietal differences in resistance. Wulma is the only variety with 95% of sound beans after 12 months' storage. As the tabulated results show, Wulma and the varieties Ibundu, Kalerera, and Varia vaganda were always among the first four; other varieties varied somewhat in their placing. A programme of hybridization between high yielding varieties and weevil resistant ones is urged.

736. Bain, D. C.
Studies of southern bean mosaics in Mississippi.
Phytopathology 1950 : **40** : p. 786.

A virus causing pod mottling and distortion commonly attacks the autumn sown crop of the bean Stringless Black Valentine in the Crystal Spring area, Miss. Differences in varietal reaction to the virus and in time for expression of symptoms at low temperatures have been noted.

737. Nilsson, F.
Lokala sortförsök med bryt-, skär- och vaxbönor 1938–1947. (**Local variety trials with stringless French beans, string beans and wax beans**).
Berätt. Alnarps Landtbr., Mej. o. TrädgårdsInst. 1949 (1950) : 29–96.

A detailed report is given of the performance of dwarf beans of the above three types in trials held in very diverse localities in Sweden during 1941–47 at Alnarp, Rånna, the experimental field in Stockholm county and Soråken, and during 1945–47 also at various places in Norrland.
Only the string bean group contains new names, e.g. Bergsgubben, Nordstjärnan [North Star] and Risbrinken, the first two being recommended for Northern Sweden. Risbrinken too can be grown in Norrland. (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts 1349 and 2146).

738. Wester, R. E. and
Jorgensen, H.
Emasculation unnecessary in hybridizing lima beans.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 384–90.

Hybridization experiments are described from which it is concluded that (1) controlled pollination of Lima beans without emasculation is superior to conventional crossing methods in which flower organs are damaged; (2) pollinating can be carried out more quickly when the flowers are not emasculated; and (3) it is possible to obtain 100% of hybrids from non-emasculated flowers by forcing the stigma of the female parent out of the keel of the large flower bud by means of pressure with forceps on the wings.

739. McWhirter, L.
Little difference in vitamin content of bean varieties.
Miss. Fm Res. 1948 : **11** : No. 11 : 1, 7.

Data are presented concerning the vitamin contents of seven varieties of bush Lima beans grown in 1948. No striking varietal differences are shown. Maturity has to be considered in evaluating nutritive value.

740. Wester, R. E. and
Marth, P. C.
Some effects of a growth regulator mixture in controlled cross-pollination of Lima bean.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 315–18.

In Lima bean breeding excessive drop of flowers and pods may considerably reduce the number of successful cross pollinations. In experiments carried out at the Plant Industry Station, Beltsville, Md, a light scratching of the base of the flower with a dissecting needle greatly aided the penetration of growth regulating substances, with the result that increases in flower setting and number of seeds produced were obtained.

741. Ulman, H.
(New varieties of cowpeas).
Hassadeh 1950 : **30** : 421–22.

The introduction of new varieties into Israel was made necessary by the susceptibility of a naturalized variety, still grown by the Arabs, to rust. Varieties introduced include the rust resistant Egyptian Lovia, Californian Blackeye 5, White Sugar Browder and White Lady. Bakirat Acco [Choice of Acco] and Nove Yoar 6 are valuable rust resistant varieties resulting from breeding work begun in 1937 at Nove Yoar, near Acco, Israel. The former was developed from a cross of the rust resistant and low quality variety Brabham with the susceptible and high quality cowpea Blackeye. Its young pods, green and dry peas can be used. Nove Yoar was from British territory and is especially suitable for the preserving industry.

742. Hare, W. W.
Many varieties compared in effort to develop cowpeas resistant to disease.
Miss. Fm Res. 1950 : **13** : No. 5 : p. 1.

Varieties from various sources were tested in 1949 for resistance to *Fusarium* wilt. Variation within varieties was found, but in general the Blackeye, Black Crowder, Red and speckled field pea types proved relatively resistant and the Crowder and lady pea types more susceptible.

743. Andersson, G.
Svalöfs Ugra soja. **(The Svalöf soya bean Ugra).**
Sverig. Utsädesfören. Tidskr. 1950 : **60** : 230–33.

This is an extended form of the article reviewed in Abst. 139.

744. Weber, C. R.
Inheritance and interrelation of some agronomic and chemical characters in an interspecific cross in soybeans, *Glycine max* x *G. ussuriensis*.
Res. Bull. Ia Agric. Exp. Sta. 1950 : No. 374 : Pp. 816.

The inheritance of seed size, date of maturity, protein percentage, oil percentage and iodine number of the oil was investigated in the cross *G. Max* x *G. ussuriensis*. Data were obtained on segregation, mode of inheritance, genetic and environmental variances, heritability, and the interrelations of these five characters. The extent of differences between the two species in respect of the characters analysed was as follows: *G. Max* was ten times greater in seed size, 9·5% lower in protein percentage, 13% higher in oil percentage, 25 points lower in iodine number of the oil than *G. ussuriensis*, and matured 11 days later.
The largest seeded F_2 segregate bore seed a little over half the size of the seed of *G. Max*. Positive skewness of F_2 and F_3 distributions for seed size suggested considerable partial dominance of genetic factors for small size of seed, as measured on an arithmetic scale. Interaction of the genes for seed size was multiplicative when their phenotypic expression was measured on an arithmetic scale, but additive when the data were transformed to a logarithmic scale. Seed size showed a highly positive correlation with oil percentage and a highly negative correlation with iodine number of the oil. The character of seed size was estimated to be 55% heritable. The data indicate that it was determined by a large number of major genes and minor modifiers.
The F_2 and F_3 distributions for date of maturity showed transgressive segregation considerably beyond the expression of the character in either parent. Genes determining date of maturity lacked dominance; nor was this character found to be associated with any of the others. The nature of the action of the genes concerned appeared to be additive. Among the characters studied, date of maturity was determined by the least number of genes. The character was calculated as 86% heritable.
Transgressive segregation for high protein content was shown by the F_2 and F_3 distributions. Genes controlling high protein content were dominant and their interaction was additive or a combination of additive and multiplicative effects. The character of protein content was 70% heritable, and showed a high negative correlation with oil content and moderate negative correlation with seed size.
Factors controlling oil percentage showed no dominance; their interaction was largely of the additive type; a relatively large number of genes was involved; the heritability of the character was estimated as 64%. Oil percentage showed a high positive correlation with seed size and high negative correlation with protein percentage and iodine number of the oil. The data indicated that the oil percentage of the F_1 could be estimated from the oil percentage of the parents. Inheritance of iodine number was similar to that of oil content. The character exhibited high negative correlations with seed size and oil content, and was 47% heritable.
It is suggested that the knowledge of polygenic inheritance gained from the study of this interspecific cross should be of value in hybridization work involving cultivated types of soya bean; the allelic differences in such material might not however be as large.

745. Geeseman, G. E.
Physiologic races of *Peronospora manshurica* on soybeans.
Agron. J. 1950 : **42** : 257–58.

The occurrence of three physiological races of *P. manshurica*, identified by the reaction of Richland and other differential varieties of the soya bean, is reported from the Wisconsin Agricultural Experiment Station.

746. Boosalis, M. G.
Studies on the parasitism of *Rhizoctonia solani* Kuehn on soybeans.
Phytopathology 1950 : **40** : 820–31.

A study of physiological races of the parasite was included. The five soya bean varieties tested showed only minor differences in susceptibility.

747. Carr, R. B.
Compare vegetable soybean varieties at Delta Station.
Miss. Fm Res. 1948 : **11** : No. 12 : p. 4.

The results are given of a test of USDA introductions, commercial varieties and selections from varieties and crosses; yield, seed quality, number of beans per pound and plant height are indicated.

748. O'Kelly, J. F.
S100 proves best extremely early soybean available.
Miss. Fm Res. 1948 : **11** : No. 5 : Part 2 : p. 8.

The best soya bean varieties for cultivation in the hilly parts of Mississippi are indicated. A table shows bushels per acre, oil percentage and days to maturity for early and late plantings of 14 varieties.

749. Ekbrant, L.
En blick på ärtsortimentet i de nya frökatalogerna. (**A glance at the selection of peas in the new seed catalogues**).
Fruktodlaren, Stockholm 1950 : No. 2 : 52–55.

Most of the important new varieties of peas belong to the marrowfat and sugar pea classes. Notes are given on the habit and quality of some of the newer and older varieties in these two groups, as well as the edible podded marrowfat pea obtained by crossing Kungsärt [King pea] with the marrow fat type.
Most of the newer varieties have been mentioned in *Plant Breeding Abstracts* from time to time.

750. Lamprecht, H.
Über Entstehung und Vererbung von schmalblättrigen Typen bei *Pisum*.
(**On the origin and inheritance of narrow-leaved types in *Pisum***).
Agri Hortique Genetica, Landskrona 1949 : **7** : 134–53.

The genetics of the narrow-leaved wild types of pea is reviewed and a new narrow-leaved mutant, line 799, with rounded leaves and stipules instead of the pointed form of the wild types is recorded as being due to a double recessive *ten ten*. The heterozygote *Ten ten* is much more like the normal than the mutant form. On the other hand, the narrow-leaved condition in the wild form due to the gene *X* is completely dominant. Environmental influences greatly affect the range of variation of the length/breadth index in plants segregating for the new mutant and render classification difficult except for the extreme classes.

751. Lamprecht, H.
Die Vererbung verschiedener Infloreszenztypen bei *Pisum*. (**The inheritance of different types of inflorescence in *Pisum***).
Agri Hortique Genetica, Landskrona 1949 : **7** : 112–33.

A detailed study of the action of genes affecting the distance between the flowers in 2-flowered inflorescences of *Pisum* has demonstrated the existence of a new type of

inflorescence, in which the first and second florets are unusually wide apart. The factor responsible for this condition, designated the *distans* type, is *Dt*. Two other genes, *Pr* and *Pre*, affecting the length of the inflorescence were also identified.

752. LAMPRECHT, H.
Interchanges in *Pisum* caused by gene mutations and the partner of interchange of *V—Le*.
Agri Hortique Genetica, Landskrona 1949 : **7** : 85–95.

The presence of strongly parchmented pods in *Pisum* is conditioned by the genetic factors *P* and *V*, while edible pods are determined by the combinations *Pv*, *pV* or *pv*. The gene *v* tends to mutate with a frequency of from 3 to 6 per 1000. In 4 out of 12 cases studied mutation in *P* and *V* was accompanied by an interchange and it appears almost certain that a causal relationship between mutation and interchange exists and that the mutation is the primary phenomenon which leads to the occurrence of the interchange.
In the writer's opinion *V* and *P* may be regarded as polymeric genes whose different phenotypic expression and mutation frequency are due to their location in two different chromosomes, namely IV (*N–Z–Fa–Td–V–Le*) and VI (*F1–P1–P–W1o*) respectively.
Evidence from crosses involving *Le* and *V* suggests that: (1) the strongly linked factors *Le* and *V* are concerned in an interchange which also affects the segregation for fertility and semi-sterility; and (2) that another gene also affects internode length and is located very near *P*. For this gene the symbol *Lo* (*longitudo*) is suggested.

753. WELLENSIEK, S. J.
New linkages in *Pisum*, *Cr—Gp* and *B—L*.
Genetica 1950 : **25** : 183–87.

The crossing-over value for *Cr*, which influences flower colour, and *Gp* for green pods was found to be 9·7—12·7%, and that for *B*, another gene affecting flower colour, and *L* which in combination with *A* gives an indented seed coat 10·6—23·5%.
Fl for grey spotting of the leaves and *P* for pod membrane were found by Lamprecht to be linked with a crossing-over value of 34·8%. The present author obtained a value of 35·9%.
The linkage between *B* and *L* explains the association between pink flowers and smooth seeds which had erroneously led to the hypothesis that *B* and *L* were identical.
The three linkage groups all occur in crosses between Crimson Rose and Geelkelk. Additional evidence from other crosses is included.

754. VOLOSKY YADLIN, E.
Ensayos de variedades de arveja para conserva. **(Variety tests with canning peas).**
Agric. Téc. Chile 1949 : **9** : 53–66.

Special features required, in addition to yield, in a canning pea are uniform ripening, which rules out varieties with long stems or climbing habit, peas which remain green after cooking, which rules out the yellow varieties, and good flavour, texture, and size of seed. In Chile most manufacturers prefer a small seed where the picking is done by hand; gradual ripening is preferred to uniformity.
Tests were carried out on 15 varieties from the USA. The varieties Alaska and Sta Adela were rejected for canning purposes on account of their growth habit. Those most suitable for mechanical shelling were Alaska, Merit, White Pea, Scotch Green, Laxtonian 8943 and Sta Adela. In total yield, Little Gem 8974 was superior to all the rest; the varieties immediately following Little Gem differed in different localities. The highest green yield was given by Little Gem, Merit and Giant Stride.
The varieties Alderman, Carter's Dairy, Improved Persian, Teddy Roosevelt 6777, World Record 8859 and Laxtonian 8943 were rejected on account of their large seed, and Improved

Penin, Scotch Green, World Record and Sta Adela for their small pods, which make hand shelling difficult.
The aggregate of the results leads to the selection of Little Gem 8974 for mechanical harvesting and Wisconsin Perfection for hand picking and for fresh consumption.

755. WINDHAM, S.
New English pea lines for state being developed.
Miss. Fm Res. 1949 : **12** : No. 10 : p. 7.

The results of a test of 13 varieties and 9 breeding lines are given. Crosses are being made between larger podded types and P–84 to increase the pod diameter of the latter, an early line with excellent quality, fill and yield. In the breeding nursery, 63 lines were grown for selection purposes. Individual plant selections were made and seed of three promising lines was saved for increase. Varietal recommendations are included.

756. BALASUBRAHMANYAN, R.
The association of size and colour in gram (*Cicer arietinum* L.).
Curr. Sci. 1950 : **19** : 246–47.

Data have been obtained indicating that factor *B* (cf. *Plant Breeding Abstracts*, Vol. VII, Abst. 483) exerts a pleiotropic effect upon petal colour, seed coat colour and seed size, and that the dominant factor *P* counteracts the effect of decreasing seed size possessed by *B*; thus plants with the genotype *Bp* are small seeded; those with the genotypes *bp*, *bP* or *BP* bear large seeds.

757. SUBRAMANYAM, K.
Anthesis in *Cajanus indicus* Spreng.
Curr. Sci. 1950 : **19** : p. 215.

It is pointed out that information on anthesis is of importance in crop breeding. Observations are reported on anthesis in the variety 216–061 of *C. indicus*, grown at the Hebbal Agricultural Farm, Bangalore.

758. CHASE, S. S.
Spontaneous doubling of the chromosome complement in monoploid sporophytes of maize.
Proc. Iowa Acad. Sci. 1949 : **56** : 113–15.

In a group of 48 haploids of Golden Bantam sweet corn, the grain set was well over expectation, a result believed to be a consequence of spontaneous chromosome doubling.

759. HABER, E. S.
Longevity of the seed of sweet corn inbreds and hybrids.
Proc. Amer. Soc. Hort. Sci. 1950 : **55** : 410–12.

Data are presented on the percentage germination of seed of inbreds and hybrids stored from three to seven years. In general the longevity of the seeds of hybrids was better than that of the parents. Crosses between inbreds with good longevity of seed had good longevity of seed, and hybrids between inbreds with much shorter longevity of seed had shorter longevity of seed. When a cross was made between one inbred with good seed longevity and one with poor seed longevity the hybrid seed was much longer lived than the seed of the latter parent.

760. HABER, E. S.
Variations in yield and cutting percentage of sweet corn hybrids.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 302–04.

Variations in yield and cutting percentage shown by nine hybrids included in sweet corn yield tests during a period of 5 to 8 years are discussed. Cutting percentage is the amount of sweet corn which can be processed from each ton of ears purchased from the grower. Yields expressed as tons per acre were definitely influenced by the weather conditions but tonnage and cutting percentage were not correlated. Factors which influence cutting percentage, with the exception of smut and soft rots, are not clearly defined; the data presented do not elucidate the problem of why cobs and husks are proportionately heavier or lighter in different years.

761. BOWERS, J. L. et al.
Sweet corn tests show hybrids adapted to Mississippi.
Miss. Fm Res. 1948 : **11** : No. 9 : 2–3.

An account is given of the 1946 and 1947 cooperative sweet corn trials. Yield and ear worm damage were taken into account in 1946, and yield and quality in 1947. The leading hybrids are Tristate, Aristogold 2, Iogreen 16, Illinois Golden 10, Aristogold Bantam 1 and Aristogold Bantam 3. An attempt is to be made to breed a variety which is earlier, more resistant to ear worm and equal or superior to Golden Cross Bantam in quality.

762. ERWIN, A. T.
The origin and history of pop corn.
Econ. Bot. 1950 : **4** : 294–99.

Archeological and other evidence is presented in support of the view that popcorn originated from mutants of flint maize which probably arose in both pre-Columbian and post-Columbian times. The white man and not the aboriginal Indian, it is suggested, first recognized and propagated popcorn, a step which naturally developed out of the parching of maize practised by the Indians. It is considered that the correct name for popcorn is *Zea Mays* L. var. *indurata* (Sturt.) Bailey mut. *everta* (Sturt.) Erwin.

763. DRAIN, D. D.,
OVERCASH, J. P.,
HANCHEY, R. H. and
DOWNEY, A. H.
A preliminary report on the yield and oil content of clonal strains of garden sage.
Proc. Amer. Soc. Hort. Sci. 1949 : **53** : 371–74.

Tests of clonal strains of *Salvia officinalis* carried out at Knoxville, Tenn., have indicated that both environmental and genetic factors influence oil content. If environmental factors are made as uniform as possible selection of strains with improved oil content should be feasible.

764. KRAUS, E. J.
Salvias.
Nat. Hort. Mag. 1950 : **29** : 142–43.

A white flowered sport arose from plants of the red flowered variety America. The inheritance of flower colour in crosses involving America, the white sport and purple flowered plants collected in Hawaii is described.

BOOK REVIEWS

FISHER, R. A.
Statistical methods for research workers. Biological monographs and manuals. No. V.
Oliver and Boyd, Edinburgh and London 1950 : 11th ed. 16s. : Pp. xv + 354 : 12 figs. : 74 tables.

Professor Fisher's well-known manual has not been reviewed in these Abstracts since the seventh edition appeared in 1948 (cf. *Plant Breeding Abstracts*, Vol. IX, p. 141). A brief addition in the eleventh edition describes certain innovations in the original plan of the book, namely the recognition of degrees of freedom, the use of fixed probability levels in tabulating the functions used in tests of significance, the analysis of variance and the need for randomization in experimental design. It is the best tribute one can pay to the achievements of Professor Fisher to say that these terms are now household words in the theory and practice of statistics, and must now be dealt with in any text-book of statistics worthy of the name.
The principle has been followed in successive editions of leaving the main structure basically unaltered, but of adding new numbered sections. The main changes since the seventh edition are two—(1) a test of homogeneity of evidence used in estimation has been added to the last chapter, and (2) the *t*–test has been extended to find fiducial limits for the ratio of means and regression coefficients. In addition the analysis of variance has been exemplified at an early stage by casting the tests for a mean, and for a difference between two means in terms of it, thus helping to throw light on the tests as particular cases of the more general test of homogeneity of a set of means.

J.W.

COCHRAN, W. G. and
COX, G. M.
Experimental designs.
John Wiley & Sons Inc., New York, Chapman & Hall Ltd., London 1950 : $5.75 (46s.) : Pp. ix + 454 tables.

The literature on field experimentation is extensive, but the ordinary text book on statistical methods is generally only able to touch on the simpler designs. More and more interest is being shown, especially by plant breeders, in trials of the incomplete block or incomplete Latin square type, as methods of dealing in one experiment with a fairly large number of varieties in only a limited degree of replication, yet with the advantage of heterogeneity elimination associated with smaller trials. The present publication is the first reasonably complete compendium on the subject, and should therefore be of very great assistance to the plant breeder who wishes to choose a lay-out suitable to the restrictions he is impelled to adopt, and who desires guidance on the actual statistical analysis appropriate to the chosen lay-out.
After introductory chapters on the accuracy of experiments and the basic statistical analysis of the result, there are ten chapters on specific classes of design, followed by final chapters on the analysis of the results of a series of experiments and on the use of random permutations of numbers. The ten central chapters range from one on completely randomized, randomized block and Latin square designs, through factorial experiments, with the "confounding" principle introduced, to the whole range of balanced incomplete block designs, incorporating lattice designs and incomplete Latin squares.
A valuable feature of the book consists of the listed plans at the ends of chapters. Thus, suppose the plant breeder wishes to test 11 varieties in a total experiment of not more than about 6 times this size, he can look up Table 11·3 on p. 328 (plans for balanced incomplete blocks) and find that Plan 11·20 suits his purpose and is of Type IV. Plan 11·20 is set out as a field plan on p. 333 following the index, and all the plant breeder has to do to set up his trial is to randomize the varieties within blocks, and likewise the order of the blocks. For

Type IV he then turns to p. 322 and can see a worked-out example of the appropriate statistical analysis. He may alternatively in similar fashion find an appropriate incomplete Latin square.

J.W.

SINGER, C.
A history of biology.
Henry Schuman, New York 1950 : revised ed.: $5.00 : Pp. xxv + 579 : 194 figs.

Dr Singer's History of Biology has for many years been one of the best introductions to the subject in English. The revised edition differs very little from the original, the alterations being in the sections on viruses, sex determination, parthenogenesis, and the nature of the gene, which are brought up to date. The result of the rather perfunctory reediting is that the present edition is a less satisfactory presentation of present views on the history of biology than the original edition was when it was brought out. Thus, apart from such trivial omissions as the date of Pavlov's death, which occurred after the first edition was brought out, several of the views expressed on such diverse subjects as cytology, the nature and scope of scholastic philosophy, and the significance of the renaissance would quite likely have been modified in a more thorough rewriting. However, the present edition may still be recommended as a good general guide to an intricate and at times obscure subject.

JEPSON, G. L.,
MAYR, E. and
SIMPSON, G. G. (Editor).
Genetics, paleontology, and evolution.
Princeton University Press and Geoffrey Cumberlege, London 1949: $6.00 (40s.) : Pp. xiv + 474 : 5 figs.

For many years past geneticists and paleontologists have tended to jar against each other when discussing evolution. Not until the publication of Dr Simpson's *Tempo and Mode in Evolution* in 1944 (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 485), was any satisfactory attempt made to synthesize the results of the two lines of study, but since then, and to a considerable extent owing to the stimulation of Dr Simpson's book much work has been done towards integrating the two approaches. The volume under review serves as a synopsis of these recent studies, being brought out under the auspices of the Committee on Common Problems of Genetics, Paleontology and Systematics of the National Research Council of the USA. There are 23 contributions. very heterogeneous in nature, but all conforming fairly closely to current neo-Darwinian views.

The first paper by A. Knopf is on the absolute time scale of the geological record. It is succeded by five rather general papers by C. Stern, W. P. Spencer, D. M. S. Watson, D. D. Davis and T. Just, respectively, on what are termed evolutionary viewpoints.

With the next four papers, the problem discussed is more specific, namely evolutionary trends and their explanation. The introductory paper to this section is by A. S. Romer and is a general discussion on trends in animal evolution with much tilting at orthogenesis. Such trends as the author admits are attributed to orthoselection, not always very convincingly. There appears to be some uncertainty among the contributors as to whether continual increase of size is to be regarded as a simple adaptive response or not. The papers by T. S. Westoll on the Dipnoi and H. E. Wood II on rhinoceroses are largely factual accounts of what changes have occurred in the groups considered. The last paper of this section, by R. W. Chaney, recounts the rather nebulous data on evolutionary trends provided by the higher plants.

The three following papers deal with evolutionary rate, the first being by G. G. Simpson, who has made this subject peculiarly his own. His treatment is largely a development of

the views put forward in his earlier book, though dealing also with some of the criticisms that have been raised since then, and also with the recently restated theories of evolutionary rhythms. It is noted that evolutionary rate has not been shown to depend on the length of generative period. G. L. Stebbins Jun., is the author of the following paper on evolutionary rate in plants. He expresses general agreement with Simpson's conclusions on evolutionary rate, though observing that bradytelic plants do not necessarily exist in large populations. Professor Stebbins also agrees that bradytely is usually found among specialized plants, but there is no satisfactory explanation either here or elsewhere in the symposium as to what exactly is meant by specialization. The last paper on evolutionary rate is by B. Patterson on the taeniodonts.

Some very interesting points of view are put forward in the six papers devoted to speciation. The first by E. Mayr follows the lines of his book on this subject (cf. *Plant Breeding Abstracts*, Vol. XIII, p. 378), with a special criticism of sympatric speciation. D. Lack's paper is concerned with biological isolation and is followed by one on incipient allopatric speciation in the Lepidoptera by E. B. Ford. In the paper by J. A. Moore on the interbreeding relations of the North American *Rana* species, an interesting case is presented of a greater degree of hybrid sterility subsisting between different races of *R. pipiens*, than between some hybrids of *R. pipiens* and other species. The paper by W. Hovanitz deals with interspecific hybridization in North American Lepidoptera and is followed by a description by H. L. Mason of genetic submergence of *Pinus remorata* through hybridization with *P. muricata*.

Two very different papers make up the section on adaptation. The first is by S. Wright on the mathematical theory of selection; the second, by E. H. Colbert, deals with adaptive trends in fossil reptiles, posing the problem as to why adaptations successful in the crocodiles should have preluded extinctions in the phytosaurs.

Only one paper, by J. B. S. Haldane, deals with human evolution. It is noteworthy for its reserve.

The symposium is summarized and glossed by H. J. Muller.

SIMPSON, G. G.
The meaning of evolution. A study of the history of life and of its significance for man.
Oxford University Press, London 1950 : 18s. : Pp. xv + 364 : 38 figs.

A book on evolution by a paleontologist makes rather different reading from a work on the same subject written by a geneticist. The author of the present volume is Curator of Fossil Mammals and Birds in the American Museum of Natural History and in the first section he treats the matter very much from the angle of the fossil record. The course of development of living beings is traced from the earliest protozoon to modern man in Hollywood (part of the book was, it is stated, written in Hollywood and this fact has undoubtedly exercised a certain influence on the author's train of thought). The evidence is confined largely to the animal kingdom but this is taken as sufficient to prove the main fact that evolution has occurred and to indicate the basic features of the process. The author is refreshingly impartial in his presentation, and has adhered well to the cardinal principles of the Dwight Harrington Terry Foundation of Yale University, under whose auspices the material was presented in the form of the Terry Lectures, the goal of which is "loyalty to truth, lead where it will, and devotion to human welfare." In doing this the author has succeeded in clearing away many popular misconceptions which have arisen from the widespread human tendency to set up opposing beliefs which are mutually exclusive: random as opposed to oriented change for instance. Both have occurred in evolution and no secret is made of the opportunism whereby the results have been achieved. We feel that the author himself has not escaped one fallacy of what he refers to as the "nothing but" type in dismissing so completely the role of the threshold controlling genes as postulated by Goldschmidt and his school. The views of the "opposing" school, represented by Sewall Wright, Fisher and other students of population genetics, are most adequately assimilated and presented.

The least convincing section of the book is Part III, where the repercussions on human society and the search for an ethic are considered. Here the treatment becomes more subjective. "Man is the highest animal," it is stated, and is unique in being able to some extent to control his destiny. How he can efficiently do this and observe the dictum "democracy is the only political ideology which can be made to embrace an ethically good society by the standards of ethics here maintained" remains as much in doubt at the end of the lectures as at the beginning. Many other doubts and popular fallacies have however been rectified and the volume takes a worthy place beside its predecessors, which began with J. Arthur Thomson's "Concerning Evolution" and included contributions by such eminent authorites as Herman Weyl, John Dewey and Carl Gustav Jung.

MANTON, I.
Problems of cytology and evolution in the Pteridophyta.
Cambridge University Press 1950 : 45s. : Pp. xi + 316 : 279 figs. : 8 tables.

Professor Manton's work on watercress is well known. She succeded in showing, by cytological study, that what has for centuries been regarded as an "ordinary" plant belonging to a single "good" species consists in reality of two distinct species differing in chromosome number, in morphological features and in genetic affinities. She has now done the same for the ferns: not one but innumerable fern species have been shown to be cytologically and phylogenetically composite; even the common polypody is not above suspicion and proves to have at least three components, diploid, tetraploid and hexaploid respectively, the hexaploid being apparently an amphidiploid hybrid between the other two. Moreover, the diploid is a preglacial species and the tetraploid a post glacial, the hexaploid being thus the most recent of all. The corresponding triploid and pentaploid forms have also been found.

Here then is what the cytological study of a common fern reveals. Many other common ferns prove to be amphidiploid species, and some types which have baffled generations of taxonomists are resolved into aneuploid series and the suggested affinities are shown to correspond to morphological and other resemblances which have indeed sometimes led independently and contemporaneously to suggested changes in their taxonomic arrangement. The curious cytological features associated with the apogamous ferns have also been considerably elucidated by Miss Manton and two chapters are here devoted to a description of them and of their significance. It emerges that the apogamous condition is invariably associated with a condition of hybridity, and often, though not exclusively, with polyploidy. Thus the apogamous form of the male fern is shown to be an interspecific hybrid, now classed as a separate species *Dryopteris Borreri*, and occurs in diploid, triploid, tetraploid and pentaploid forms. The complicated mechanism whereby the omission of cell division after mitosis in the sporangia results in the double chromosome number, which is then halved at meiosis without the need for true chromosome pairing, seems to be a natural response to interspecific hybridity and to have arisen independently in a number of unrelated forms. These adjustments do not occur when apogamy is induced artificially in normally sexual species, in which case the plants obtained have all the characteristics which we have come to associate with haploids, either secondary or, at least in one case described, basic. Even the horsetails, probably "the oldest living genus of vascular plants known to science," the chromosome number for which has been reported in the literature with figures varying from $2n = 24$ to $2n = 230$, have not daunted Miss Manton. Her technique is such that she can say, with the utmost *sang froid*, of all the species of *Equisetum* examined, that "it is probable, indeed almost certain, the [haploid] chromosome number of them all is actually 108." Here, too, signs of hybridity are detected in certain Irish species, though not accompanied by polyploidy. Both genera of the Psilotaceae, on the other hand, exhibit polyploidy, the number of chromosomes in *Tmesipteris* being described as "horrifying" and assessed as between 400 and 500. Finally, we have the lycopods, of which *Lycopodium Selago* is referred to as "the worst cytological object I know" but which has nevertheless been seen to show clear signs of irregular pairing at meiosis, and hence would seem to be

"the most ancient impure species that cytology has so far detected." Its sporophytic chromosome number "cannot be less than 260."
In *Hymenophyllum tunbridgense*, on the other hand, $2n = 16$, in the *Selaginella* species examined $2n = 18$, and in the Osmundaceae, another primitive group with a fossil record rivalling that of *Equisetum*, $2n = 44$. The fact that both the highest and the lowest numbers are found in the most primitive groups is taken as a sign of antiquity: the process of polyploidy has been carried much further in the greater time available, though some representatives of the original state have been preserved. In the ferns proper these initial diploid forms have died out or are rare, a fact of evolutionary significance as indicating the high survival value of the higher members of the polyploid series. The process would ultimately seem to lead to extinction however, since the polyploid forms are less prone to exhibit genetic variation.
These are, in a few words, the main conclusions of the author of this remarkable book. It is fascinating both by the nature of the objects studied and by the masterly manner of the treatment. It is beautifully printed, uncommonly accurate, and contains an abundance of excellent illustrations, the cytological photographs in particular being of a remarkable standard of quality. It is likely to remain a standard work for a long time.

Tischler, G.
Die Chromosomenzahlen der Gefässpflanzen Mitteleuropas. (**The chromosome numbers of the vascular plants of Central Europe**).
Dr. W. Junk, 's-Gravenhage 1950 : 42.50 guilders (£4.). Pp. 263 :

A knowledge of chromosome numbers is of value to the cytologist, geneticist, systematist and plant geographer, and chromosome numbers are becoming an increasingly useful aid in understanding the systematics and phylogeny of plants. The most complete list of chromosome numbers is that by Darlington and Janaki Ammal published in 1945; this includes plants in nearly all parts of the world. Professor Tischler has been the main instigator for the publication of lists of chromosome numbers of a particular geographical region. His early efforts more than 20 years ago have stimulated other workers to follow his example, and chromosome number lists of several geographic regions, including Great Britain, have now become available.
Professor Tischler has in this list of chromosome numbers collected all known references dealing with the recorded chromosome numbers of the native and naturalized wild vascular plants of Central Eurpoe. Thus for example, he gives 18 references dating from 1884–1945 for *Lilium Martagon* L., and 59 references dating from 1909–1947 for *Crepis virens* L. Whilst respecting the thoroughness with which these records have been drawn up, it is open to doubt how far the early chromosome counts may be considered useful. Although these early counts are of historical interest, decrease in early literature citation might have led to a decrease in the cost of this book and thus made it more generally available at a reduced price.
Despite this, the book will no doubt be widely consulted by those interested in chromosome numbers.

L.S.

Gatenby, J. B. and
Beams, H. W.
The microtomist's vade-mecum.
J. & A. Churchill Ltd., London 1950 : 11th ed. : 45s. : Pp. xiv + 753 : 8 illus.

This new edition is the result of some considerable revisions, and rearrangements of the chapters. In the changes two chapters have been discarded "Tissue Cultures" and "Staining" and a new one included, that by Dr Hyman on "Laboratory Cultivation of Invertebrata." Dr Callan has revised and added to Dr Painter's earlier chapter on "Animal Chromosomes," and Dr Catcheside, who again is responsible for the chapters on botanical techniques, has added many new notes to his earlier work. His chapters remain

substantially the same except that he has condensed some of the old material to allow the addition of the new.
In essence this book retains the form of the 1937 edition and is about the same size. In making this so, the editors and contributors have had a difficult task. It has been their aim to preserve as much of the original material as possible, in the belief that old techniques can be an inspiration towards the solution of new difficulties, and hence may be revived. This edition thus seems to inherit all that is best from its forerunners and the handbook, being fully up to date, should well continue to fulfil the needs of both specialist and student.

G.E.D.

ROBBINS, W. W. and
WEIER, T. E.
Botany. An introduction to plant science.
John Wiley & Sons Inc., New York, Chapman & Hall Ltd., London 1950 :
$5.00 (40s.) : Pp. ix + 480 : figs. : tables.

The most striking feature of this book is the quality and use of the illustrations, which have four points to commend them: they are very numerous as compared with those in other text books; they occur close to the parts of the text relating to them, so that it is seldom necessary to turn to another page to consult them; the labelling is nearly always in full and can thus be comprehended at a glance; and, with few exceptions, notably some of the photographs illustrating stages of mitosis and meiosis, they are very clear and fulfil their purpose excellently.
As for the scope of the book, it is concerned more with morphology and anatomy than with physiology. Instructions for practical work in the laboratory are not included.
The subject matter is presented in a manner likely to arouse and sustain the student's interest and to give him a good general conception of the subject as a whole. The practical applications of botanical knowledge are frequently pointed out, and the relations between the different branches of botany are not lost sight of.
Controversial topics are for the most part avoided. When they do receive attention it is pointed out that differences of opinion exist, and one selected theory is outlined. Unfortunately no references are given to the literature containing alternative theories. The omission of bibliographies from text books of this standard, which are intended for the use of first year university students, is by no means uncommon but is nevertheless to be deplored.
The book is strongly bound and well printed, the double column format being employed.

ARBER, A.
The natural philosophy of plant form.
Cambridge University Press 1950 : 25s. : Pp. xiv + 247 : 46 figs.

Mrs Arber's latest book on plant morphology constitutes what is probably the most skilful defence that has yet appeared of that decaying discipline. While the general tendency in botany has been away from pure morphology in favour of more concrete studies, a few workers, preeminently Mrs Arber herself and Troll in Germany, have continued with and considerably developed the theoretical foundations of plant morphology.
A striking feature of Mrs Arber's book is its appreciation of Aristotelian philosophy, not only as the matrix from which morphology developed historically, but as a valuable background for contemporary morphological thinking. This appreciation has its parallel in the revival of Aristotelian ideas in pure philosophy.
The earlier chapters of the book are historical, reviewing the development of plant morphology from Aristotle to Goethe and de Candolle. Jung, who is responsible for a large part of our present botanical terminology, is regarded askance by Mrs Arber, who finds his treatment of botany somewhat arid.

In chapters V to XI, Mrs Arber presents her own views on the theoretical foundations of morphology. The irrelevance of phylogeny is indicated at the outset, and the views proposed are a development and refinement of Goethe's theory of morphological types. Turning to the plant body of the higher plants, with which the book is principally concerned, Mrs Arber suggests that the shoot is the fundamental morphological category and that both leaf and root are to be regarded as partial shoots displaying however "an inherent urge towards the development of whole-shoot characters." Evidence for the latter statement is provided from amongst the vast array of morphological data of which Mrs Arber has so profound a knowledge.

In the last two chapters, morphological thinking is examined in itself and in relation to physiology. Here Aristotle's four causes are brought to the fore. Physiology is regarded as the study of efficient and material causation, while morphology is believed to be concerned with formal causation with which Mrs Arber is inclined to blend final causation. Thus the morphological type is regarded as an expression of the formal cause of the organism. It is stated that knowledge of formal causes must in part be intuitive, and the role played by visual representations in this connexion is emphasized.

No review can do justice to the highly polished and subtle theory that Mrs Arber has presented, but it is perhaps relevant to inquire how far this theory is likely to captivate a more earthy minded botanist. Mrs Arber emphasizes that the morphological type is a valid concept provided it is kept consistently on the abstract plane. But why be abstract? On p. 208 Mrs Arber suggests that morphological thought attempts to penetrate towards the thing-in-itself. It has already been noted that Mrs Arber supposes that morphological knowledge may be partly intuitive. But is there in fact any justification for supposing that the human mind has any such intuitive faculty? Mrs Arber presents an interesting series of figures to demonstrate the urge to whole-shoot-hood in the leaf. It is undeniable that this theory unifies a rather heterogeneous assortment of data; what is doubtful is whether this unification is more than a mental projection. While not ruling out the possibility of intuitive knowledge in other connexions, most botanists will be highly suspicious of any theory that involves preterinferential knowledge of plants.

CLARK, A. H.
The invasion of New Zealand by people, plants and animals.
Rutgers University Press, New Brunswick 1949 : $6.00 : Pp. xiv + 465 : 81 figs. : 80 tables.

Despite a slightly misleading title, for only the South Island of New Zealand is treated, this book is a veritable mine of information on every conceivable topic relating to the geographical history of the area since the beginnings of European colonization. The role played by men, animals and plants in the progressive transformation of the island is carefully studied and the intricate interdependence of these three elements is forcefully brought out. Particular significance is attached to the fact that the bulk of the early colonizers from Europe were unskilled labourers who had, at least, nothing to unlearn, and are held to be responsible, at root, for many of the differences in the agronomical practice of the country from that of Great Britain. The history of the muddleheadedness and general inefficiency of the early colonizing ventures originating in Great Britain makes sordid if interesting reading, and the disastrous consequences of irresponsible introductions of plants and even more of animals, which have subsequently become large scale pests, is well illustrated.

The book is profusely illustrated with excellent photographs and abounds in maps and statistics covering all the topics discussed. There is a comprehensive bibliography and an equally valuable collection of references to the many related topics which are but briefly mentioned in the text. As a work of reference for biologists, agronomists, historians and geographers alike this book will be of permanent value, although the general reader would perhaps have embarked upon it with greater confidence if the excellent resumé which forms the conclusion had been placed as an introduction at the other end of the book.

R.H.R.

LINDEGREN, C. C.
The yeast cell, its genetics and cytology.
Educational Publishers Inc., Saint Louis, Missouri 1949 : $7.00 : Pp. xviii + 365 : figs. : tables.

The yeast cell, with its apparently intranuclear vacuole and associated structures, has been variously interpreted and has for long presented a cytological problem. The genetics of yeast, however, is a more recent study, begun by Kruis and Satava who first demonstrated the distinction between haploid and diploid forms, and extended by Winge *et al.* who independently made the same discovery. Lindegren and his colleagues began their investigations of yeast genetics about 1940, and since that time have made a very large number of single spore isolations and controlled matings. Their findings have mainly been published immediately in scientific journals. The work under review represents a survey of their work during the last ten years. References are made here and there to the work of others, but the greater part of the book is devoted to the researches of the author and his colleagues, and it is evident that very great progress has been made by them in the study of yeast genetics. Detailed accounts are given of the techniques employed in handling yeasts, in particular of isolating single spores, preserving strains, inducing sporulation, etc., and in this respect the book will undoubtedly be of considerable use to those engaged in research on yeast. Experimental results are presented in detail and there are numerous photographs, tables and diagrams. These form a valuable record and will enable others to compare their findings with those of Lindegren. Following the work of Beadle and Tatum with *Neurospora*, Lindegren *et al.* have studied the inheritance of characters such as the ability to synthesize various vitamins or to ferment various sugars, using strains produced by hybridizing species which differ in their biochemical potentialities. Such characters have the great advantage that they can be analysed precisely, whereas morphological characters often obscure one another. This work, coupled with tetrad analysis, has enabled Lindegren to find several linked characters and hence to prepare the first chromosome maps of yeast. Moreover, this is the first time that centromeres have been mapped without distinguishing first and second-division segregation in individual tetrads, but the author has used a rather unsatisfactory graphical method for determining the position of the centromeres and has not made clear that tetrad analysis for three unlined loci is the essential requirement. The finding of normal Mendelian inheritance for a number of characters and the mapping of genes on chromosomes has clarified the cytological picture and enabled the deduction to be made that apparently normal chromosomes exist in yeast.

The creditable achievements in the practical study of yeast genetics described in this book are unfortunately overshadowed by interpretations of the data which are often highly speculative or even based on faulty reasoning. Thus on p. 10 of chapter 13 (it is necessary to refer to the page in this manner since each chapter starts afresh at page 1), evidence for the existence of multiple alleles controlling mating-types in the *Hymenomycetes* is incorrectly used as evidence for a high mutation rate. On p. 7 of chapter 24, a six-point map of a yeast chromosome is given. There is very poor agreement among certain of the map distances and consequently the true sequence of the centromere and the loci *ad* (affecting adenine synthesis) and *pn* (affecting pantothenate synthesis) is uncertain. Nevertheless, Lindegren has drawn a precise map, the sequence having apparently been chosen arbitrarily. He even attempts to explain away the discrepancy in the figures by hinting at non-random strand relationships between successive cross-overs, and on p. 3 of chapter 25 the position and strand-relationship of cross overs are given regardless of the uncertainty as to the sequence of the loci. In chapters 25 and 26 certain abnormal tetrads showing non-Mendelian ratios are interpreted as the result of "gene conversion" through the influence in the heterozygote of one gene on its homologue. This may be the correct explanation, but most geneticists would be reluctant to accept it until alternative explanations such as mutation, heterocaryosis or cytoplasmic influence have been satisfactorily eliminated. The existing evidence against these hypotheses is not convincing. In the final chapter, in which Lindegren presents his views on the structure of the gene, "gene conversion" plays a large part. Until the existence of this phenomenon is satisfactorily established, this interpretation must be regarded as speculative.

The general appearance of the book leaves much to be desired. The printing resembles typescript, the right hand margins of the print are uneven, and the numbering of the pages, figures and tables is by chapters instead of consecutively through the book. There are numerous typographical and other errors, giving the impression that the work was put together hurriedly. Thus the work of Emerson referred to on p. 6 of chapter 4 and of Kniep on p. 3 of chapter 12 are not given in the bibliography, and on page 15 of chapter 27 maize and *Drosophila* are referred to in consecutive sentences, but no reference is made to either by name.

To conclude, valuable contributions to the cytology and particularly to the genetics of yeast are brought together in one volume for the first time, but the deductions made from the experimental data and the conclusions reached represent essentially a particular point of view and are not necessarily the only possible interpretation.

H.L.K.W.

Ainsworth, G. C. and
Sampson, K.
The British smut fungi (Ustilaginales).
Commonwealth Mycological Institute, Kew, Surrey 1950 : 20s. : Pp. 137 : 21 figs.

Since the last general account of British smuts was Plowright's monograph published in 1889 this new work will fill a space in the bookcase which has long been empty. Its general excellence, however, will ensure that it will be found more frequently upon the working bench than upon the shelf. One of the aims of the writers has been "an attempt to meet the need for a new systematic treatment of the smuts of this country and to provide a general account of the order." Having an intimate knowledge of their subject they have fulfilled this aim with distinction, producing a book which contains many original data as well as much information previously scattered in the literature.

The first four chapters deal with the general biology, cytology, genetics and classification of the smuts and there is a further chapter on the techniques used in studying these fungi. These accounts are written with clarity and provide a summary of present knowledge, about 600 references being quoted. The work will be of the greatest value to those whose primary interest is in the smuts as organisms and to those whose main concern is with the diseases caused by them. It should also be of value to geneticists and plant breeders. Since the information summarized is drawn from the papers of workers in all parts of the world it will be of use to readers not resident in the British Isles.

The greater part of the book is devoted to descriptions of the smuts which have been found in England, Wales, Scotland and Ireland. There is a key to the genera and many drawings illustrating the spores of the various species and their mode of germination. The morphological description of each species is extensive and this should greatly facilitate identification. There is also information regarding spore germination, the methods of infection and racial specialization. In many instances there are extensive data under these headings; where less is known about a species the authors have pointed out the lack of knowledge, for another of their aims has been "to encourage much-needed work on the biology of these fungi." As it is apparent from the brief chapter on cytology that this is largely an unexplored field, it is to be hoped that Dr Ainsworth's and Miss Sampson's masterly work will encourage cytologists to turn their attention to the smuts; it should certainly stimulate further researches upon the biology of this important group.

M.A.K.

Thung, T. H.
Grondbeginselen der plantenvirologie. (**Foundations of plant virology**).
Meded. Alg. Proefst. Landb., Buitenzorg 1949 : No. 99 : Pp. 132 : (H. Veenman & Zonen, Wageningen).

A publication by this author on plant viruses needs no recommendation. The present work appears to cover the ground very completely and concisely, and includes a beautiful

reproduction in colour of Bosschaert's still life of 1619 depicting tulips with virus disease. A very useful feature is the brief description of the diseases referred to, or references to Smith's description (1937) where this exists. There is also a classified summary of virus diseases of Vorstenland tobacco. The bibliography occupies 17 and the index 6 pages.

C.B.

25e beschrijvende rassenlijst voor landbouwgewassen 1950. **(Twenty-fifth descriptive list of varieties of agricultural crops 1950).**
Inst. Plantenveredeling, Wageningen 1950 : Pp. 288 : tables.

This latest edition of the familiar and most useful handbook contains much information regarding 456 varieties, giving brief descriptions of each, the cultural conditions for which each is suitable, statistics of acreage and composition, resistance to diseases and so on.
The crops described are divided into nine groups: fodder and green manuring crops (non-leguminous and leguminous); plants for permanent pastures, leys, sports and flying fields and lawns; cereals; pulses; flax, winter cabbage, opium poppy, caraway and mustard; potatoes; sugar beet; chicory; and onions. Each crop or group of crops is briefly introduced with details of cultivation and desirable characteristics, such as dry matter and protein content of fodder crops, shape of roots and approximate yields, before the individual varieties are described. The source or breeding of each is also given.
There is a short chapter giving advice on registering varieties under the Breeders' Decree. Details of acreage of varieties, by provinces and for the whole Netherlands, are tabulated. Included is a "Commentary on the Contents" in English which not only explains the variety list but gives full lists of translations of Dutch terms used in describing the varieties so that the guide is as useful as if it were written in English. Moreover the Dutch names of the crops are usually followed by the botanical names, which may be used to clarify the occasionally mysterious "English" name.
In addition to common agricultural crops, the following less usual are included: artichoke, poppy, canary grass, caraway "one of the most speculative crops," spurrey, sunflower and *Phacelia*. Lupins are divided into fodder and bitter; and there are data on sugar, dry matter and protein contents and protein yields for fodder beet.
The list contains an amazing amount of information and is one of those fascinating pocket books that answers almost any question within its scope.

C.B.

Kuckuck, H. and
Mudra, A.
Lehrbuch der allgemeinen Pflanzenzüchtung. **(Textbook of general plant breeding).**
S. Hirzel Verlag, Zürich 1950 : Pp. xi + 280 : 57 figs. : 21 tables.

In addition to knowing the practical methods used in plant breeding, the efficient plant improver requires an understanding of such subjects as genetics, plant physiology and plant pathology. A general textbook of moderate size must therefore either curtail its discussion on some of these subjects or assume a certain basic knowledge. The authors of this book have assumed only a basic minimum, and have successfully combined the various aspects of the subject whilst paying particular attention to the more practical problems of plant breeding.
The book is divided into four parts. The first part deals with the causes and practical importance of plant variability. This includes an account of the principles of genetics and their cytological basis, and also contains a brief discussion on heterostyly, apomixis, ecotypes, and centres of origin. A list is also given of the chromosome numbers of about 100 cultivated plants. The second part of the book deals with the physiological basis of plant breeding and gives a short account of the principles of plant physiology. This includes a discussion of developmental problems, plant resistance to adverse environments,

and plant resistance to disease. The third part describes the methods of plant breeding. It analyses the advantage of such methods as mass selection, single plant selection, hybridization and inbreeding followed by outcrossing. There is also a chapter on "mutation breeding" which deals with the practical possibilities of induced gene mutations, and genome mutations (polyploidy). The last part of the book discusses the arrangement of a plant breeding establishment, and describes the statistical methods which are available for the lay-out of field trials and the analysis of results. An additional chapter deals with the origin of cultivated plants.

Although not meant as a reference work, it is unfortunate that there are so very few references, these being given in the form of footnotes. A list of the more important references at the end of each chapter would have greatly added to the value of this book. The contents are however well balanced, and the authors deal adequately with the wide aspects of plant breeding with special regard to their practical importance. The book should serve as a good introduction to those who may become plant breeders in the future, and can be read with profit by all those interested in the furtherance of plant improvement.

L.S.

PETERSEN, A.
Die Gräser als Kulturpflanzen und Unkräuter auf Wiese, Weide und Acker. (**The grasses as cultivated plants and weeds of pasture, meadow and ploughland**).
Akademie-Verlag, Berlin 1949 : Bound 15. 50 DM., Unbound 13. 75 DM. : Pp. xii + 225 : 77 figs : tables.

This is the second edition of a book written in order to interest practical agriculturalists in the study of grasses and grasslands, and to enable them to identify the grasses of pasture, meadow and ploughland. In this object it has succeeded admirably. In the first two parts of the book an illustrated description of the common grasses is combined with a key to their identification both in the vegetative and flowering state. The author has here accepted what he considers to be the commonly used Latin names for each of the grasses described. He gives the new names of those no longer accepted as correct in the form of an appendix. As this book is primarily intended for those not previously trained in the nomenclature of grasses, it would have been more desirable to use the correct Latin names in the text and to give the no longer accepted synonyms in the appendix.

The third part of the book describes the occurrence of grasses on the various types of pastures, meadows, and ploughland, and also discusses the problems of grass utilization and management. There is an additional chapter which deals with the general value of grassland, and this contains a plea for the judging of grasslands in relation to the general problem of producing fodder crops.

L.S.

NOSTI, J.
La patata de siembra en España. Variedades y zonas de producción. (**Seed potatoes in Spain. Varieties and zones of production**).
Madrid 1949 Publ. Minist. Agric. Ser. A, No. 6 : 40 pesetas : Pp. 214 : 2 figs. : 15 illus.

This small Spanish monograph on the potato starts with a brief historical account of the introduction of potatoes into Europe, in which the view is expressed that there were two introductions into Spain, the first being of the *Solanum andigenum* type from Cuzco, and the second, towards the end of the 16th century, of the *S. tuberosum* type from Chile. In later times there have been innumerable further importations into Spain, both of South American forms by travellers, and of commercial varieties from European countries and elsewhere. The chaos that resulted led to the establishment of a potato improvement station (Estación para la Mejora de la Patata) at Vitoria in 1932, the object of which was to test imported varieties, maintain a supply of selected healthy stocks of both imported and Spanish

varieties and create new ones by hybridization. A list of the potatoes grown in Spain in 1947 comprises over 60 varieties but the most popular was Alava with 18·9% of the total tonnage.

A chapter is devoted to the taxonomy of the genus *Solanum* in general and the section *Tuberarium* in particular, based largely on the work of Bukasov and Juzepczuk. The diagnostic characters which serve for the classification of potato varieties are fully described, together with the various factors that affect their expression. These include climate, and there is a description of the areas in Spain which are most suited to the production of healthy stocks. Under the headings such as earliness, yield, and resistance to the various diseases, the main varieties grown in Spain are classed according to their behaviour. Part III comprises a full description of these varieties, arranged alphabetically, with coloured plates illustrating the characteristic features of the plant, flower and tuber. The descriptions include indications of origin, synonyms, disease resistance, earliness, climatic adaptation, utilization and popularity, as well as morphological features.

WESTVELD, R. H.
Applied silviculture in the United States.
John Wiley & Sons Inc., New York, Chapman & Hall Ltd., London 1949 :
2nd ed. : $6.00 (48s.) : Pp. xi + 590 : 102 figs. : 38 tables.

The second edition of Professor Westveld's *Applied Silviculture in the United States* provides a comprehensive introduction to North American sylvicultural methods, particularly from the ecological angle. The book contains eighteen chapters, each devoted to a separate forestry region, and for each region, the author provides brief notes on its location and land tenure, fuller information on its physiography, climate, and the development of its forests, and then a detailed treatment of the sylviculture of the various ecological types found in the region. For each forest type, the author discusses the botanical composition and age distribution of the trees, regeneration, economic value, cutting programme, other sylvicultural operations, and disease incidence and control.

Professor Westveld's book provides a mine of information on its subject and has full bibliographies at the end of each chapter. One drawback however is consequent on the arrangement of the subject matter according to forestry region; since the forest types frequently recur in different regions, this involves considerable duplication or cross-referencing. One also wonders whether the strict adherence to the classical ecological categories suggests a distinction between the various forest types that is far less apparent in the forests themselves than in the manual.

BEWLEY, W. F.
Commercial glasshouse crops.
Country Life Ltd., London 1950 : 50s. : Pp. xii + 509 : illus. : tables.

From its beginnings about 100 years ago, the glasshouse industry has now, we are told, become the most productive and the most complicated of all branches of horticulture. Its methods are necessarily so specialized that a comprehensive treatise on the subject such as Dr Bewley's book provides, will undoubtedly fill a very real need. The treatment is both readable and scientific and exceedingly thorough. The book is practical throughout, while including sufficient theoretical discussion to give its recommendations their full weight. All aspects of the planning and building of a nursery are dealt with and a chapter on the soil follows. The importance and methods of composting, and the use of artificial fertilizers are both soberly discussed, while the author wisely takes no sides in what might be called the "compost controversy." The principal commercial glasshouse crops receive separate treatments covering every aspect of their cultivation and marketing. Of these most attention is deservedly given to the tomato, since this is both the most important crop and that to which most research has been devoted.

Although modern research is mentioned throughout the text wherever it is appropriate, a final chapter on recent applications of science to glasshouse culture is specially to be commended. Thus the grower is brought in contact with such matters as hydroponics, photoperiodism, use of growth hormones and the potentialities of polyploidization.
The volume is copiously illustrated, chiefly by photographs. These are excellent, but their value is much impaired by their insertion frequently among irrelevant pages of the text and by the lack of any reference numbers.

R.H.R.

Tuinbouwgids 1950. **(Horticultural guide 1950).**
Uitgave der Directie van de Tuinbouw, Den Haag, 1950 : f 4 : Pp. 748 : figs. : tables: maps.

The continued success of this Dutch reference book on horticulture and the ever increasing amount of information that has to be included each year have led to the decision to enlarge the format to medium 8vo, relinquishing the attempt to retain the pocket size.
The encylopedic range of the contents, already commented on in reviewing the earlier 8vo editions (cf. *Plant Breeding Abstracts*, Vol. XVIII, p. 604–5 and Vol. XIX, p. 674), makes it difficult to imagine what question of interest to professional or amateur horticulturists would not find its answer in the guide. A random sample from the 30-page subject index might yield information on: postage rates and regulations in Holland; holidays; well known figures in the horticultural world; associations, societies and official bodies concerned with horticulture; phytopathology; soils and manuring; legislation; exports and imports; horticultural practice; vegetable, fruit, flower and bulb growing; the cultivation of trees and shrubs; seed production; and tobacco.
Horticulture and the Benelux countries; the use of transparent film in packing; accident prevention; fruit drying; phenological research; and a brief contribution by Dr de Haan on the importance of cytological research in plant breeding are subjects cited from the section containing short articles of topical interest.
Horticulturists and horticultural institutions in countries where horticultural science and practice have reached a high level will readily realize the value of this guide.

Pellegrin, F.
Les Légumineuses du Gabon. **(The Leguminosae of the Gaboon).**
Librairie Larose, Paris 1948 : Pp. 284 : 8 plates. (Mem. Inst. Ét. Centrafricaines No. 1).

The Gaboon with its 30 million hectares of forest offers rich material for the systematist whose interest lies in the flora of such regions. Fortunately there is also available a copious fund of herbarium material and other records collected by numerous botanists who have worked in this field, and of this F. Pellegrin was able to take advantage in compiling the present memoir which classifies and describes the 125 genera and 450 species of legumes found in the Gaboon. Of the 125 genera, 17 belong to the Mimoseae, 50 to the Caesalpinieae, and 59 to the Papilioneae. In addition to the complete descriptions of the species with observations on vernacular or local names, the geographical distribution, the name of the collector and the reference to the particular collection from which M. Pellegrin made his descriptions, dichotomic keys for the diagnosis of genera and species have also been provided.
So far as the author's knowledge goes, all the known species that occur in the following areas are included: (1) the southern Cameroons where dense forest predominates; and (2) the Gaboon, i.e. the greater part, or the whole, of the Como, Ogooné, Ngounyé, Nyanga and Kouilou basins. Some species too that have not yet been reported in the Gaboon but have been met with in neighbouring regions similar in type, e.g. Spanish Guinea, are also cited.
Some excellent drawings of some of the most characteristic fruit types in the Mimoseae, Caesalpinieae and Papilioneae and an alphabetically arranged index of the Latin and other names of genera and species completes this fine contribution on tropical legumes from the French Institute for Central African Studies.

NEW JOURNALS

Annales de l'Institut Expérimental du Tabac de Bergerac.

The first number of this French journal, issued in May, 1950, contains articles on: growth in tobacco; insecticides for tobacco pests; the extraction and purification of stocks of tobacco mosaic virus; and the two genetic studies reviewed in Abst. 501 and 503. The journal is well printed and freely illustrated with plates.

Colonial plant and animal products.

This publication, issued quarterly, is the successor to the Plant and Animal Products Department section of the Bulletin of the Imperial Institute. It contains articles, reports of recent investigations at the Colonial Products Advisory Bureau, notes, book reviews and bibliography. The journal may be obtained from H.M. Stationery Office, London. Price 5/- per copy.

Revista de la Facultad de Ciencias Agrarias.

The faculty of Agricultural Sciences of the University of Cuyo, Argentina, has begun the publication of this Review covering current agricultural research, principally in the state of Mendoza. Two articles of interest to plant breeders have been summarized in *Plant Breeding Abstracts* (cf. Vol. XX, Absts 2592 and 2633). Further information about the journal may be obtained from the Faculty.

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